Railway Age Gazette

Including the Railroad Gazette and the Railway Age

Published Every Friday and Daily Eight Times in June, by the
SIMMONS-BOARDMAN PUBLISHING COMPANY,
83 Fulton Street, New York.

CHICAGO: 417 South Dearborn St. CLEVELAND: Citizen's Bldg.
LONDON: Queen Anne's Chambers, Westminster.

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Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico	$5.00
Canada	6.00
Foreign Countries (excepting daily editions)	8.00
Single Copies	15 cents each

Engineering and Maintenance of Way Edition and the four Maintenance of Way Convention Daily issues, North America, $1.00; foreign, $2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

Volume 53. October 4, 1912. Number 14.

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THE special letter ballot taken by the Master Car Builders' Association on propositions for changes in the M. C. B. rules of interchange to abrogate the rules that penalize the delivering line for owner's defects which, under the present rules, become delivering line defects when a car is offered in interchange, and to add a direct percentage of 10 per cent. to the labor and material charges as shown on the monthly bills, resulted in an affirmative vote on both propositions. It is expected that this will promote a more prompt exchange of cars at interchange points, and will greatly relieve the congestion at these points during periods of heavy traffic. The resolutions of the arbitration committee proposing these changes, were published in the *Railway Age Gazette* of September 13, page 476. The necessary changes in the M. C. B. code will be made and officially distributed by the association within a few days, to become effective at 12:01 a. m. on November 1. In the meantime the railways and interchange bureaus will hold meetings of their inspectors for the purpose of drilling them in the amended rules.

OF the four annual reports on which we commented in the issue of September 27, two showed remarkable gains in operating efficiency, and the other two showed considerable gains in this respect, although the roads to whose business they related have had for a number of years unusually high records for economical and efficient management. But one of these four companies showed a reduction in passenger train mileage comparable with the changes in the amount of passenger business handled. The Missouri Pacific handled 5.16 per cent. less passenger miles in 1912 than in 1911, with a decrease of but 2.70 per cent. in passenger train mileage. The Chicago, St. Paul, Minneapolis & Omaha handled 5.21 per cent. less passenger miles, with an increase of 1.15 per cent. in the revenue passenger and mixed train mileage. The Chicago & North Western handled 2.47 per cent. greater passenger mileage in 1912 than in 1911, with an increase of 5.40 per cent. in the mileage of revenue and mixed trains. The Chesapeake & Ohio had a decrease of 0.3 per cent. in passenger miles, and an increase of 4.7 per cent. in passenger train mileage. These figures illustrate a marked tendency in American railway service. It may be possible to handle a largely increased passenger business with a comparatively small increase in passenger train mileage; but it is seldom, if ever, possible to reduce passenger train mileage to correspond with a large reduction in number of passengers carried one mile. There is a constant demand for improved service in the passenger department; and there is so strong an insistence that service once established shall not be reduced that it amounts almost to an absolute veto. This has always been the case on American railways, and most railway managers are disposed to think that since this is what the public wants, that is what it will continue to get. The state and interstate commissions, however, are not disposed to admit that passenger service should be given weight when considering the reasonableness of freight rates, despite the fact that all the companies that allocate expenses as between freight and passengers show—if not an actual loss on passenger business—a very small margin of profit. If freight revenue must contribute to the cost of passenger service, the passenger service given should in fairness be considered in discussing freight rates.

THE question as to just how far the privileges of the floor should be extended to the representatives of the railway supply interests in railway conventions is a perplexing one. The Traveling Engineers' Association, more than any other organization we know of, seems to be handling this problem in such a way as to secure the best results. It seems to be the practice of that association to call upon the engineering experts of the supply companies for such information as the members of the association may be specially desirous of knowing. Listed in the ranks of the railway supply fraternity are a large number of ex-mechanical department railway officers, who when in railway service were noted for their executive ability and their engineering knowledge. In many cases since leaving railway service these men have concentrated their attention on the development and construction of railway devices, and are exceptionally well fitted for explaining to railway men just how the devices in which they are interested can best be employed and maintained. They are thus in a position to be invaluable to the mechanical department associations, and wherever desirable the associations should take advantage of this. They must make it thoroughly understood, however, that such representatives are not asked to appear before them in the capacity of salesmen, but as technical engineers and experts. With such an understanding there should be little possibility of the supplymen

overstepping the bounds of propriety and of abusing the privileges which are extended to them. One of the most important railway supply companies is noted because its representatives, located throughout the country, are not known because of their ability as salesmen, although they are not deficient in this respect, but because of their ability as engineers. They are not only consulted by the railway officers from time to time as to difficulties arising in the handling of trains on which their apparatus is used, but are welcomed before the railway clubs and mechanical department associations, either in presenting papers or in discussing reports in which they are interested. This is a most desirable condition of affairs, and railway supplymen who are anxious to make their influence felt should use every effort, when they are thus privileged, to try to add to the occasion by giving in a dignified, clear cut and positive way the best data and advice of which they are capable. If this course is followed and the various associations insist upon having it lived up to, a troublesome question can be solved to the mutual advantage of the railways and the supplymen.

A PROPOSED REMEDY FOR ACCIDENTS.

WE recently have received two letters from railway officers who advocate the adoption of radical measures in dealing with labor organizations as a remedy for accidents. One of them was from a general manager, and was published in our issue of August 23, page 336. The other, which is from a master mechanic, and which endorses the views expressed by "General Manager," is published elsewhere this week. The remedy proposed by "General Manager" was that the stockholders and directors give managers "full power to deal with the labor organizations and instruct them to cancel all existing agreements and put others into effect, naming the rates of pay employees will receive from the time they go on duty until they are relieved, with a minimum of ten hours in twenty-four; let the superintendent be general manager of his division in so far as handling his employees is concerned, there being no appeal from the superintendent's decision; promotion to depend upon merit and the superintendent or his assistants to be the judge."

Our correspondents both see the first obstacle that would be encountered in an attempt to carry out this plan. This would be a great strike. The brotherhoods do cause many promotions to be made because of seniority and in disregard of the comparative merits of employees, and this tends to produce inefficiency. They do interfere with discipline, and this is one of the main causes of railway accidents. These conditions ought to be changed. If it could be assumed that if the railways canceled all existing contracts with the labor brotherhoods, they would win the ensuing strike, and that the result would be the establishment of better conditions all around, an attempt to apply the drastic remedy suggested might be worth while. But can this assumption be made?

If the railways should adopt the policy suggested, whether they would win the resulting strike would depend mainly on whether public opinion would endorse the policy adopted and back them in carrying it out. The usual tendency of the public in cases of railway labor disputes is to sympathize with the employees. As, in this particular case, the railways would be the aggressor, unless they could convince the public that their relations with the employees had become such as to make adoption of extreme measures necessary in the interest of the public as well as themselves, the sympathies of the public would be with the employees. It is doubtful if the roads could convince the public of this.

Suppose, however, that the roads should provoke a strike in the way suggested, and win it. Would the relations between employers and employees be more just and satisfactory afterward than they are now? Probably "Master Mechanic" practically answers this question in that part of his letter in which he criticizes railway managers because, while they now yield too much to the demands of the organized employees, they do not deal fairly with the unorganized employees.

If the roads should win a great struggle with the brotherhoods, and drive them off the railways, would employees afterward be dealt with differently from the way in which unorganized employees are dealt with now? The attitude of the managements toward the now organized employees in the days before the brotherhoods became powerful was not always one of benevolence. Excessive power, whether possessed by employers or employees, usually begets abuses. Labor unions on railways and elsewhere were formed largely to enable employees to better defend themselves against the abuses resulting from the possession and exercise of practically unrestricted power by employers. They are just as natural and proper an outgrowth of modern social and industrial conditions as are big corporations. Like the large corporations they have probably come to stay because, in spite of their shortcomings, they serve a useful purpose. It is not their existence that is objectionable, but their unreasonable demands and conduct.

It would seem, then, that the proper remedy for the evil conditions on railways that have been brought into existence by the acquisition and exercise of excessive power by the labor brotherhoods would be, not to take steps that would amount to an attack on the unions themselves, but to take steps to reduce their power within reasonable limits, and to attack the specific parts of the agreements with them and of the conduct of the organizations and their members that are unreasonable. The agreements are expiring from time to time; and when they expire is the time to make a stand against renewing their unreasonable provisions, against inserting others of the same character, and in favor of inserting such provisions as are necessary to protect the rights and interests of the roads and the public. Similarly, the time to oppose the unreasonable activities and resist the unreasonable demands of the grievance committees is at the time when these activities are manifested and these demands are made. A frank recognition of the fact that the organization of employees is all right in itself, and that their unions are entitled to a voice in determining their wages and conditions of work, accompanied by a determined resistance to unreasonable demands and conduct, and determined insistence on the acceptance by employees of reasonable wages and of conditions of employment that are necessary to the most efficient and safest operation, would make it impossible to charge that the roads were trying to destroy the unions and render it practicable for them to convince the public that they were acting in its interest as well as their own, and also in the interest of the employees. If, then, it was impossible to reach an agreement and a strike did result it could be shown that the responsibility for it was on the employees, and the chances of the railways winning it would be much better. It was chiefly because they adopted practically the course outlined here that the Harriman Lines, the Illinois Central and the Missouri, Kansas & Texas won in their present struggle with their shop employees.

In some large industries where the labor unions formerly were very strong the employers have attacked and extirpated them. Never in any industry were the unions stronger or in many ways more unreasonable than they are in the railway industry now. It is natural to suggest that as they have been dealt with elsewhere so they could and should be on the railways. But transportation is a peculiar business. Railways cannot be shut down or barricaded as manufacturing plants can be. Any interference with their service immediately causes great public inconvenience and loss, and the public at once becomes concerned and takes a decisive hand. Therefore, what has been done by any other class of employers is not necessarily an example of what ought to and could be done by railway employers. Certainly before the railways take steps that are apt to cause a violent rupture with any large body of their employees they should exercise great care to have right on their side, and to be prepared to convince the reasonable part of the public that this is the case.

DUST LAYING ON RAILWAY ROADBEDS.

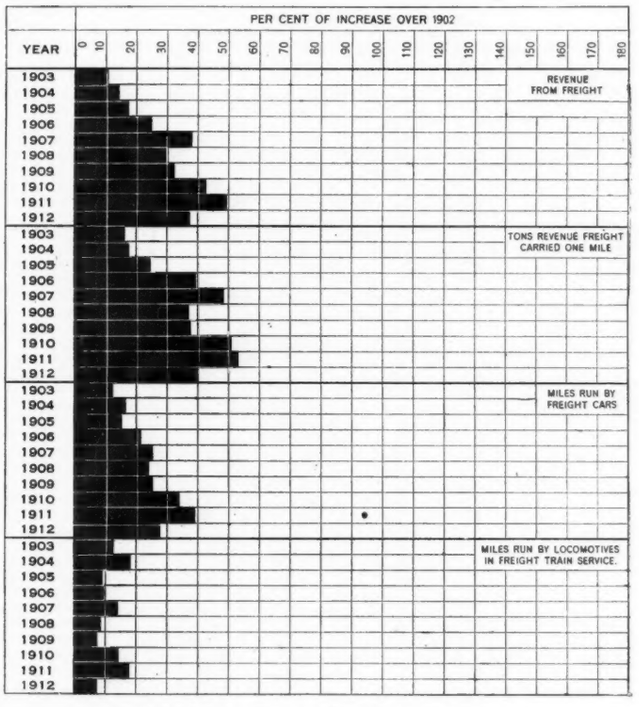
ONE of the most serious annoyances to passengers traveling during the summer months is caused by the dust which is drawn up from the ballast by the train, and which cannot be kept from entering the cars through the windows and transoms that must be open for ventilation. On through trains passengers are forced to dress with due regard to this condition and keep their hats in paper bags, and on some of the best trains the observation platform is practically deserted except while the train is standing in a terminal. In local and suburban services the period of exposure to the dirt is not so long, but the annoyance is probably greater, for passengers on such trains cannot take the precautions for traveling that through passengers do. As the density of traffic is greatest on suburban lines and the annoyance from dust is also probably the greatest, and as ordinarily through trains run over the same right of way, it is natural that suburban lines should be the first on which remedies for dusty roadbeds should be tried.

The most effective remedy for dust is to lay clean ballast. Some rock ballast is so nearly dustless that no trouble from this source is experienced where such ballast is used. If the rock crumbles, however, or if dirty gravel, cinders, slag or loam are used for surfacing the track, a fine powder-like dust is sure to be found. Oiling the surface of highways at road crossings has been practised to a limited extent on several lines, the object being to eliminate the dust at these points, which are always the worst. The application of oil to the entire surface of the ballast for the same purpose was undertaken by the Illinois Central and the Chicago, Burlington & Quincy on their Chicago suburban lines last year with results so satisfactory that the application has been repeated this summer. Crude oil is used, which is sprayed over the ballast by gravity from a tank car, the arrangement of which was described in the *Railway Age Gazette* of September 15, 1911. The Burlington used about 1,800 gal. of oil per mile at a total cost for the first 39 miles of about $50 per mile. The Illinois Central used about 2,200 gal. per mile. The experience of these two roads has been that the treatment effectively lays the dust during the season the oil is applied, and the Illinois Central found that before making the second application this summer, the track that had been oiled last year was unusually clean, although it had passed through a very severe winter. It has also been found that the oil kills weeds and grass in the ballast, and tends to prevent the subsequent growth of plants. Care must be taken to keep the oil off the rails, and it must not be placed thick enough so that free oil will stand on the surface which can be sucked up by a train or tracked about by passengers at stations. The effectiveness of the application is, of course, destroyed if the surface of the ballast is afterward disturbed, as in surfacing track or replacing ties. For this reason the oiling should be delayed until most of the heavy spring track work is done. The effects of any slight disturbances to the surface may be repaired by oiling by hand with a can.

No method for dust laying except oiling has been used on a large scale by American railways. Practically the only other information applicable to the problem has been gained by road experts in their experience with laying dust on highways. Aside from oil, either in the pure state or emulsified with a cheap soap, calcium chloride and the coal tar products have been most extensively used on highways. The calcium chloride is clean and effective, but in common with all substances solvent in water it is rapidly leached out by heavy rains. This is a more serious disadvantage on railway roadbed than on highways, for since a highway is subject to the constant wear of traffic, frequent applications of any treatment for dust laying are necessary, while as a railway roadbed is disturbed only by the elements and the suction from trains, the remedy for dust on it need only be applied at yearly intervals if a remedy is used which will withstand the weather.

ILLINOIS CENTRAL.

MAJOR HINE, in one of his "Letters From An Old Railroad Official To His Son, a General Manager," said that no general manager ever went through a long strike, successful or unsuccessful, without ultimately losing his job. What he meant to suggest was that the game was never worth the candle. The Illinois Central has gone through, during the past year, a strike that ranks in number of men out with the largest railway strike in recent years, and has come out not only with a moral victory, but with actually a stronger and more respected organization. Besides the temporary loss of revenue and the increased cost of operation, a severe strike such as that on the Illinois Central, in which 10,000 men went out, may seriously affect operations over a number of succeeding years. The railway may permanently lose business through the transfer of traffic that it is temporarily unable to handle to competitors who can permanently hold this trade; the physical property may be allowed to deteriorate because of an effort on the part of the management to keep down expenses; and the company may, although nominally



The Increase in Freight Service Since 1902.

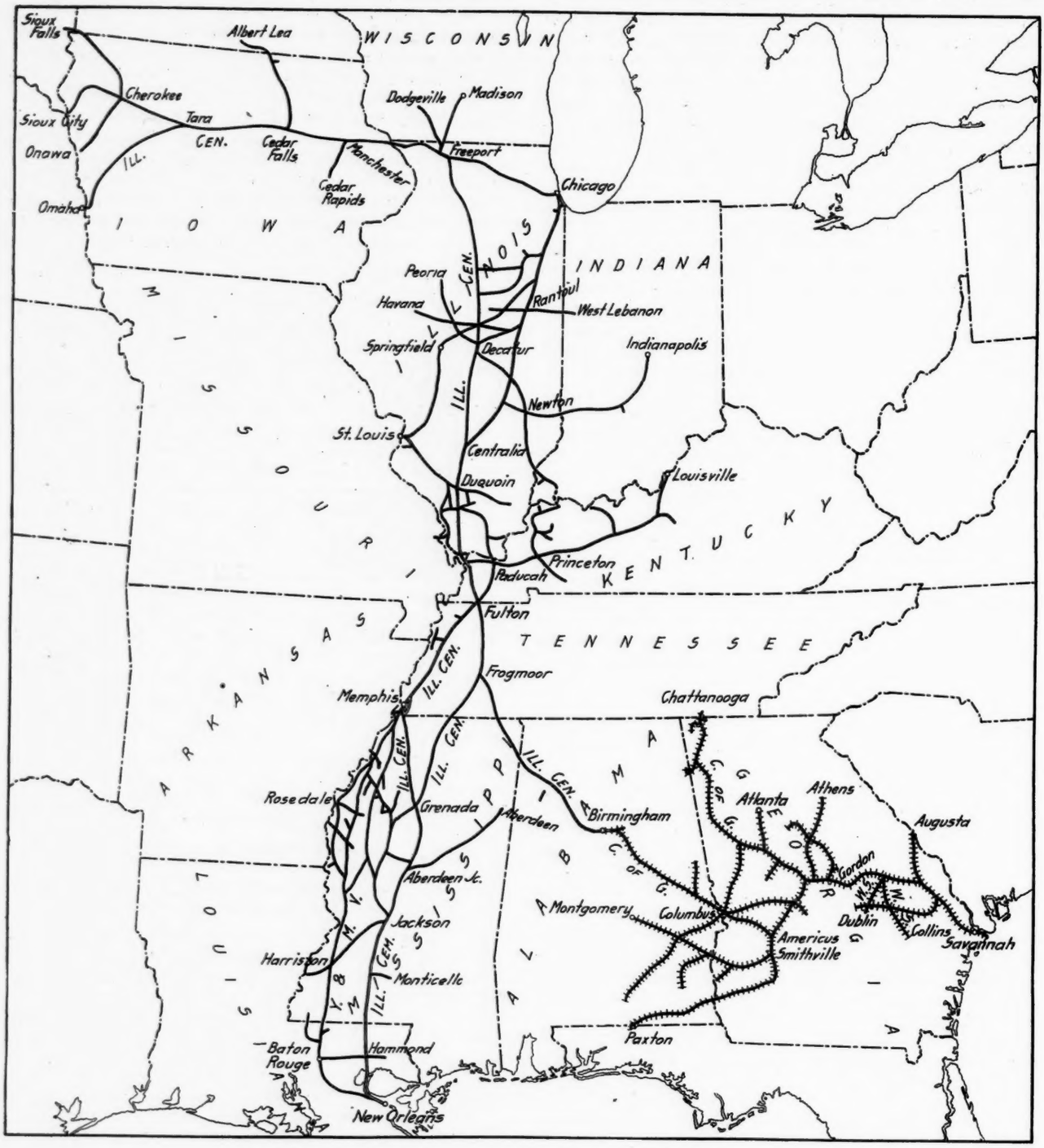
victor in the struggle, find its organization so weakened that it will take years to build it up again.

The Illinois Central felt severely the temporary effects of the strike in reduction in revenue and increase in expenses. Not only did the company have the strike on its hands, but during the fiscal year ended June 30, 1912, it also had to operate under unusually difficult conditions, owing in the first place to the very severe winter, and in the second place to the floods in the Mississippi valley. Total operating revenues amounted to $58,730,000 in 1912, a loss from the previous year of $3,360,000; and operating expenses amounted to $48,120,000, an increase of $3,360,000. In addition there was but $5,400,000 other income, an additional loss compared with 1911 of $1,310,000; so that the company at the end of the year had $3,470,000 net corporate income available for dividends, as against $11,320,000 at the end of the previous year. Regular dividends were paid, being charged in 1912 to profit and loss; so that the total net credit to profit and loss at the end of 1912 was $2,770,000, as against a net credit at the end of 1911 of $6,780,000.

This loss is for a single year. It is taken up and done with.

The company's cash position has naturally been weakened by the operation of such a year. At the end of 1911 there was $15,140,000 cash on hand, with but $200,000 loans and bills payable; while at the end of 1912 there was but $1,860,000 cash on hand, and loans and bills payable of $5,900,000. With a road whose credit was less strong than that of the Illinois Central, this might be taken as a rather serious matter; but with a company whose credit is as firmly secure as is that of the Illinois Central, this loss of working capital and accumulation of loans and bills payable simply means that the company is waiting until a favorable opportunity to permanently finance its loans and bills payable and restore its working capital. As a matter of fact, the bonded debt outstanding decreased during the past year by the retirement of $1,715,000 bonds. The Illinois Central bought in 1912 the first, second, and third income bonds of the Central of Georgia, which goes to explain the loss in cash. The bonds are carried in the June 30 balance sheet as marketable securities. The bonds are marketable in the sense that they may be sold to the Central of Georgia itself.

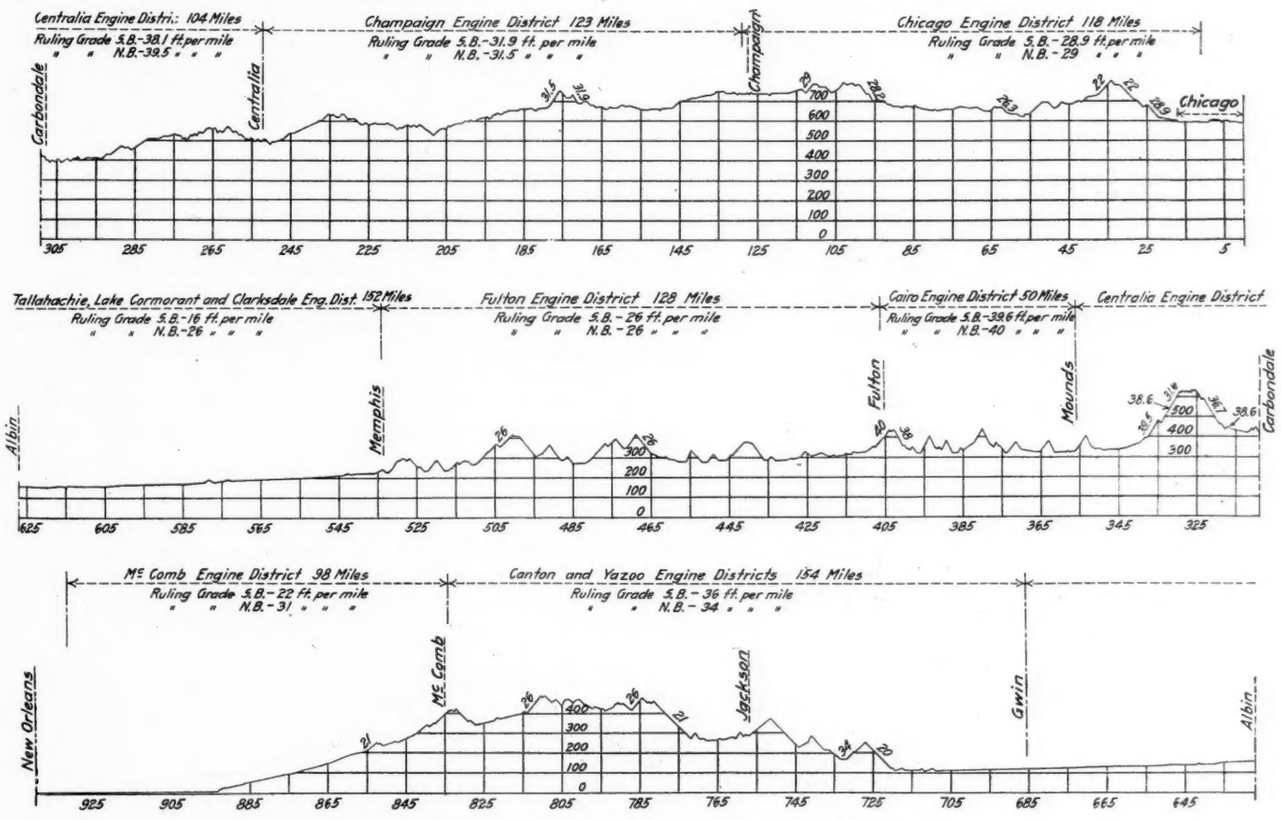
Of the evils that might be felt over a series of years, the Illinois Central has suffered not at all. The management has had the courage to go directly on with its plans for betterment of the property; the standard of upkeep has not been lowered in the slightest, and President Markham says in his report that the company's road and equipment have been greatly improved. There was a decrease of less than 1 per cent. in the amount spent



The Illinois Central and Its Controlled Line, the Central of Georgia.

for maintenance of way and structures, and the standard maintained is well illustrated by the fact that 1,800,000 ties were renewed, which is equivalent to 568 miles of track, and is 8 per cent. of all ties in track, including sidings. The cost of maintenance of equipment was 10.90 per cent. greater than in 1911; but the total cost of securing new shop employees and commissions and all the miscellaneous expenses in connection with the strike of shopmen have been charged to this year's cost of maintenance of equipment under the head "other expenses." So much as an indication of what has been done in upkeep.

The company spent $5,270,000 for additions and betterments, which includes $620,000 for real estate, $720,000 for additional tracks, $600,000 for shops, engine houses and turntables. There was 97 miles of automatic block signals installed, making 683 miles in all protected by block signals; and there is under way the installation of 111 miles of additional automatic block signals. New passenger stations were built at a number of places; new mechanical coaling plants were built at Carbondale, Ill., Centralia, Minonk and Champaign; a 100,000-gal. tank was built to replace a 40,000-gal. tank at Hart, Ill. There is certainly no indication here that additions or betterment work was abandoned, or even delayed, because of the strike and the floods.



Profile of the Low-Grade Main Line of the Illinois Central.

As to the organization of the Illinois Central, it is in far better shape than it has been for a number of years. The company, in the first place, plainly had the right on its side in the controversy with its shopmen. Through a wise policy of frankness, it kept the public informed of what was going on and retained throughout the sympathy and support of the better class of public opinion, and it earned a degree of respect from other employees beside the shopmen which in itself is worth a considerable part of the money lost by the strike. There are few instances, indeed, in the recent history of labor troubles where so serious a situation has been handled with so much frankness and so much tact.

Of course, an annual report of a year in which such a strike as this occurred could give no indication whether or not the Illinois Central had permanently lost to competitors business which it was unable to handle during the strike. It is the belief, however, of those who have followed the development of the situation most closely, that the patrons of the road felt that the Illinois Central was fighting their battle for them; that a strike of machinists, unlike a strike by locomotive enginemen or conductors, would affect not only the railways, but manufacturers themselves. If the unreasonable demands of railway machinists were successfully enforced against the Illinois Central, it would be only a question of time until machinists in a great number of other classes of work would make similar demands, and manufacturers would be faced with the same problem that the Illinois Central was working out. It is believed, therefore, that the feeling of loyalty thus engendered will more than offset a natural inclination to continue to give to competitors that were able to handle it during the strike year, business which formerly went to the Illinois Central.

The Illinois Central operates 4,763 miles of road. It is double track, with a few very short exceptions, all the way from Chicago to Memphis; and from Memphis south, as will be seen by the map, the company has the Yazoo & Mississippi Valley as well as its own line. Furthermore, its own line is double track from Jackson to New Orleans. The northern line from Chicago to Omaha is a single track line acting as an important feeder to the main north and south line, but although a Harriman line, it is not favored by the Union Pacific in the exchange of traffic at Omaha.

Of the total 26,340,000 tons carried by the Illinois Central in 1912, 38.11 per cent. was furnished by products of mines, mostly bituminous coal; 18.94 per cent. by products of agriculture; 15.93 per cent. by lumber; 8.28 per cent. by manufactures; 7.71 per cent. by merchandise (L. C. L.); 8.05 per cent. by miscellaneous carload freight, and 2.98 per cent. by live stock and products of animals. The greatest loss in tonnage was in the tonnage of lumber. In 1911 this tonnage amounted to 5,194,000 tons, and in 1912 to 4,196,000 tons. The tonnage of bituminous coal was

greater in 1912 than in 1911, because in 1911 there was a strike on in the Illinois coal fields.

It is surprising that under the conditions of operation last year, operating figures show up so well in 1912 as compared with 1911. The total ton mileage of revenue freight in 1912 was 6,210,000,000, and in 1911, 6,817,000,000. This is a decrease of 8.9 per cent. Revenue freight train miles totaled 17,154,000 in 1912, a decrease of 8.03 per cent. from 1911. Helping and light freight locomotive miles totaled 532,000 in 1912, a decrease of 17.21 per cent. Loaded car mileage decreased 7.40 per cent., and empty car mileage 9.82 per cent. The revenue freight train load was 356 tons in 1912 and 358 in 1911.

The following table shows the principal figures for operation in 1912, compared with 1911:

	1912.	1911.
Average mileage operated	4,763	4,750
Freight revenue	$37,881,766	$41,503,985
Passenger revenue	13,337,562	13,168,863
Total operating revenues	58,727,272	62,088,737
Maint. of way and structures	7,691,215	7,750,525
Maint. of equipment	13,857,549	12,495,333
Traffic	1,400,942	1,364,141
Transportation	23,653,249	21,778,531
Total operating expenses	48,121,467	44,757,857
Taxes	2,685,730	2,720,849
Operating income	7,812,719	14,553,567
Gross corporate income	13,216,303	12,268,271
Net corporate income	3,466,448	11,315,344
Dividends	*7,650,720	7,650,720
Appropriated for additions and betterments	61,481	164,847
Balance	†4,122,791	3,499,777

* Paid from and charged to profit and loss in 1912.
† Loss.

WHEELING & LAKE ERIE.

DURING the five years that the Wheeling & Lake Erie has been in the hands of a receiver there has been spent for improvements in roadway and structures from the proceeds of receivers' certificates $1,770,000, and from income $1,350,000. It will be recalled that in 1908 B. A. Worthington, who had been vice-president and general manager, was made receiver. At the time that the road went into the hands of a receiver it was in very bad shape physically. Its traffic density was so heavy that it imperatively needed a considerable mileage of double track on its main line; its equipment was old and light and its roadbed in bad repair. It will be seen that the amount spent by the receiver on improvements is far from the amount that the condition of the road and traffic possibilities would under ordinary circumstances justify. Notwithstanding this, in 1912 the receiver has a surplus of $718,000, while in 1908 the Wheeling & Lake Erie had a deficit of about $204,000, excluding the interest on the $8,000,000 notes, which are now past due.

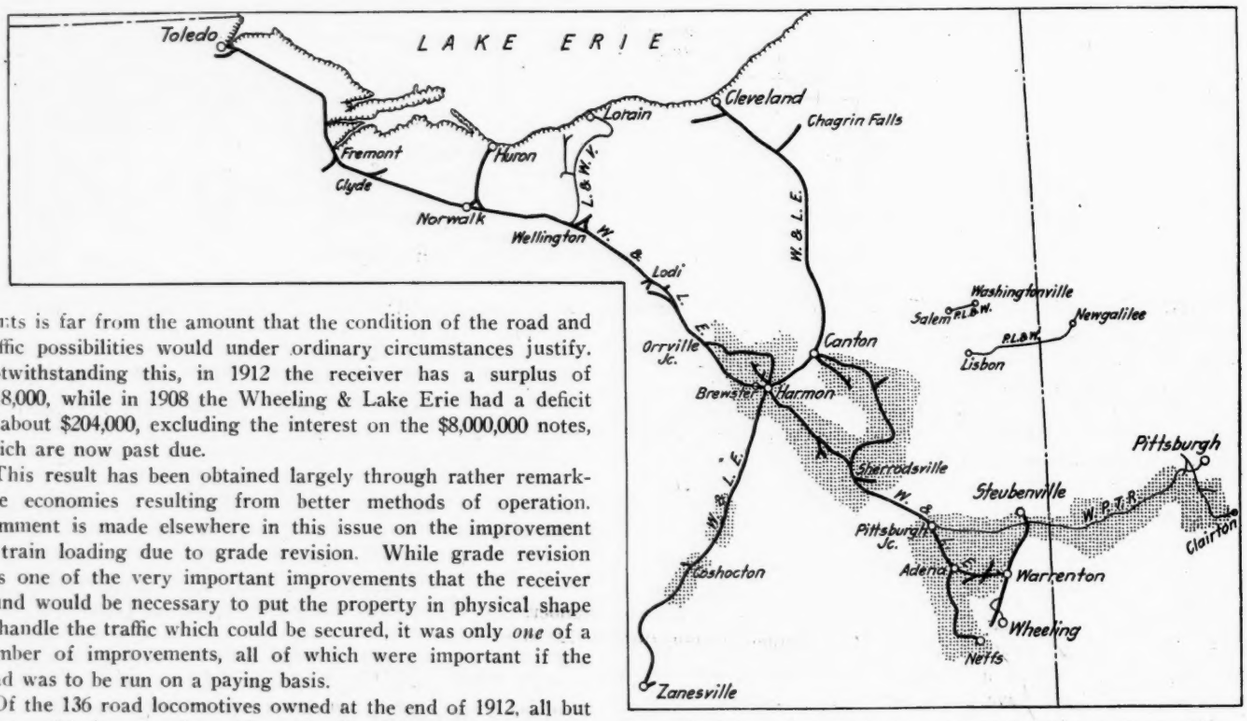
This result has been obtained largely through rather remarkable economies resulting from better methods of operation. Comment is made elsewhere in this issue on the improvement in train loading due to grade revision. While grade revision was one of the very important improvements that the receiver found would be necessary to put the property in physical shape to handle the traffic which could be secured, it was only *one* of a number of improvements, all of which were important if the road was to be run on a paying basis.

Of the 136 road locomotives owned at the end of 1912, all but 79 consolidations are from 16 to 25 years old. The last locomotives that the Wheeling & Lake Erie got were 50 consolidations in 1907. These locomotives have an average tractive power of 41,360 tons. All of these heavy engines have been through general repairs since the receivership, and a great many of the older locomotives have been almost rebuilt in process of repair. Since the beginning of the receivership it has been found necessary to get along with what cars the road had, most of which are of light wooden construction, so that the results obtained in the last five years have been secured in circumstances that made improvement in operation and gain in net earnings very difficult. In 1908 the company had 244 locomotives, and in 1912, 192. In 1908 there were 76 passenger cars, and in 1912 just the same number. In 1908 there were 14,218 freight cars, and in 1912 10,773. It might incidentally be mentioned here that although the costs of repairs per freight car were higher in 1912 than in 1911, the Wheeling & Lake Erie gets along with an unusually low cost of repairs per freight car. In 1908 this cost was $32; in 1911, $38, and in 1912, $47. With a large proportion of light wooden cars (the W. & L. E. has only 500 steel cars out of the total 10,773 owned), the road has somehow or other managed to get along without spending per car more than two-thirds what it cost most roads to repair their equipment.

Revenue ton miles in 1908 totaled 933,000,000. The gain in 1909 was 26 per cent.; the gain in 1910 over 1909 was 32 per cent., and the gain in 1911 over 1910 was 6.86 per cent. In 1912 1,175,000,000 ton miles were handled, or 11 per cent. more than in 1911.

Any well managed road showing such very large increases in traffic as this, and having a *plant adequate to handle these increases,* would show decreased cost per unit in 1912 as compared with 1908; but the point about the Wheeling & Lake Erie's gains in net is that they have been extorted from a property that is really inadequate. The way this increase in traffic has been handled has, with the exception of the grade reductions, been due to better operation and not to any great extent to betterment of the plant. For one thing, unbalanced traffic has been steadily decreasing. In 1908 this formed 44.62 per cent. of the total traffic; in 1909, 40.27 per cent.; in 1910, 40.28 per cent.; in 1911, 42.04 per cent., and in 1912, 36.90 per cent.

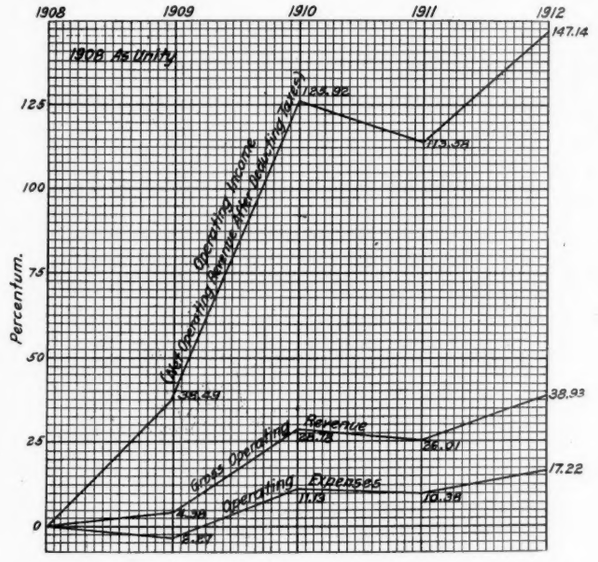
The large increase in 1912 in the tonnage of ore carried helped materially to decrease the proportion of unbalanced traffic, since



The Wheeling & Lake Erie and Its Pittsburgh Connection.

this ore movement is in the direction of empty car mileage; and although this commodity carries a very low ton mile rate, the business, as Mr. Worthington points out in the annual report, is a very profitable one, because of the large carloads and trainloads in which it can be handled, and because it furnishes a back haul for coal cars that otherwise would move empty.

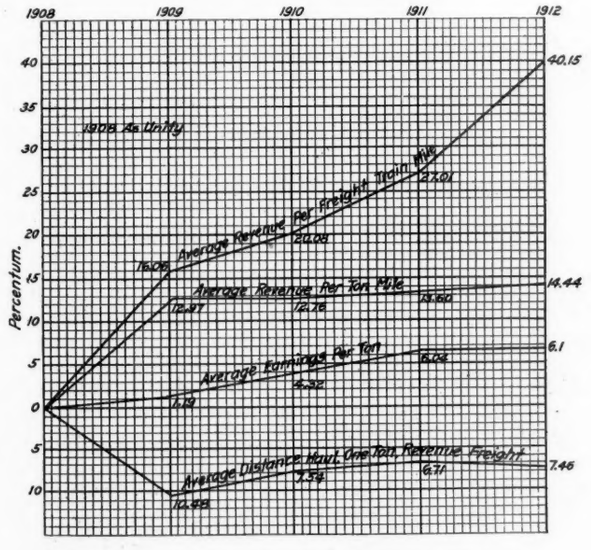
Of the total tonnage carried in 1912, which amounted to



Percentage Gain in Net Earnings Under Receivership.

10,640,000 tons, 2.73 per cent. was products of agriculture, 0.74 per cent. products of animals, 68.61 per cent. products of mines, 1.66 per cent. products of forests, 22.77 per cent. manufactures, 2.39 per cent. merchandise, and 1.08 per cent. miscellaneous carload tonnage.

The accompanying charts and the chart shown in connection with the discussion of the effect of grade reductions show better

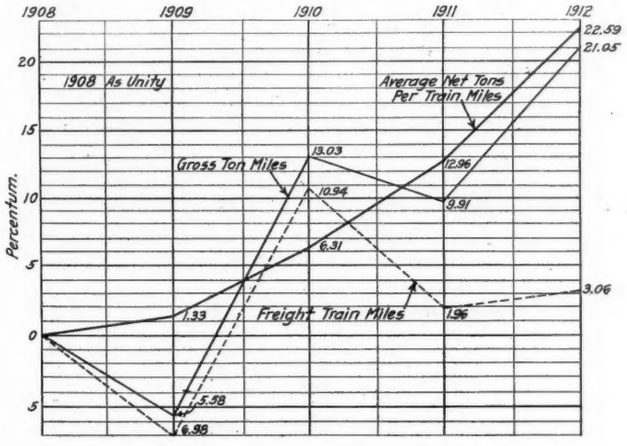


Percentage Change in Unit Revenue Figures.

than any extended comment could, what has been done. As to how it has been done one would have to rehearse in the minutest detail the history of the management of the property in these five years to give any exact figures. Each economy, each saving in wages through a reduction in overtime, each improvement in train despatching would have to be mentioned separately. No one of the improvements in method of operation has been spectacular; yet the aggregate of these improvements is certainly impressive.

In 1912 the Wheeling & Lake Erie had total operating revenue of $7,498,000, as against $6,801,000 in 1911. Operating expenses amounted to $5,038,000 in 1912, and to $4,744,000 in 1911. After the payment of rentals, interest on underlying bonds and on equipment obligations, the company had $718,000 net corporate income, as against $648,000 in 1911. If such results as these have been obtained without making any of the improvements that Receiver Worthington suggested as necessary improvements in his report for 1911, it is fair to assume that if the property can get its financial relations untangled and raise sufficient new capital to make the capital expenditures which are so badly needed for double tracking, improvement of bridges and additions to equipment, it can earn under equally efficient management a very much larger sum than it ever has earned, and, if conservatively capitalized, certainly earn a fair return on the investment.

The receiver's balance sheet shows cash on hand at the end of 1912 amounting to $992,000, with total working liabilities of $865,000. This shows careful conservation of resources, considering that the receiver has been paying interest on underlying bonds, has issued but $4,190,850 receiver's certificates during the five years he has been in charge, and has spent $2,400,000 on road, $757,877 for equipment obligations falling due during the five years, $603,257 for equipment, and $2,059,500 on equipment which



Percentage of Change in Train and Ton Mileage.

he raised by the sale of equipment bonds and obligations, making a total spent on road and equipment of $5,930,000. This is a good financial statement.

The following table compares the principal figures for operation in the five years during the receivership:

	1912.	1911.	1910.	1909.	1908.
Average mileage operated	457	457	457	442	442
Coal freight revenue	$3,157,650	$2,717,782	$2,841,679	$2,338,053	$2,442,351
Other freight revenue	3,276,444	3,037,334	3,086,890	2,466,369	2,013,088
Passenger revenue.	603,763	607,836	565,945	497,714	490,688
Total operating revenue	7,498,147	6,800,707	6,950,437	5,633,645	5,397,001
Maint. of way and structures	871,515	747,538	766,714	617,957	667,479
Maint. of equipm't	1,402,076	1,328,110	1,389,685	1,380,978	1,148,755
Traffic	90,315	96,136	85,648	74,231	79,758
Transportation	2,485,884	2,406,282	2,366,947	1,947,807	2,249,368
Total operating expenses	5,038,335	4,744,267	4,776,054	4,200,718	4,298,244
Net operating revenue	2,459,811	2,056,440	2,174,383	1,432,927	1,098,757
Taxes	367,225	248,007	261,504	260,336	252,043
Operating income	2,092,586	1,808,433	1,912,878	1,172,591	846,714
Gross corporate income	1,850,166	1,777,116	1,945,175	1,146,906	1,006,900
Net corporate income	718,117	647,961	537,451	27,432	*603,927

* Deficit, including, however, $400,000 interest on notes, which charge is not included in the following years.

ST. LOUIS SOUTHWESTERN.

ALTHOUGH the St. Louis Southwestern suffered severely from the floods in the Mississippi valley last spring, these floods were not an unmixed misfortune, as they were to some other roads. A part of the Southwestern's line remained intact, and over this line the other roads were compelled for some time to haul their freight traffic. The rentals received from the running of these trains was almost pure gain to the St Louis Southwestern, the work involving comparatively few, if any, expenses to the Cotton Belt. In other respects the year ended June 30, 1912, was a prosperous one for the company, and it had the experience which few other roads have had during the past year of an increase in revenues with a decrease in operating expenses. The operating ratio in 1912 was 69.92 per cent., and in 1911, 72.16 per cent.

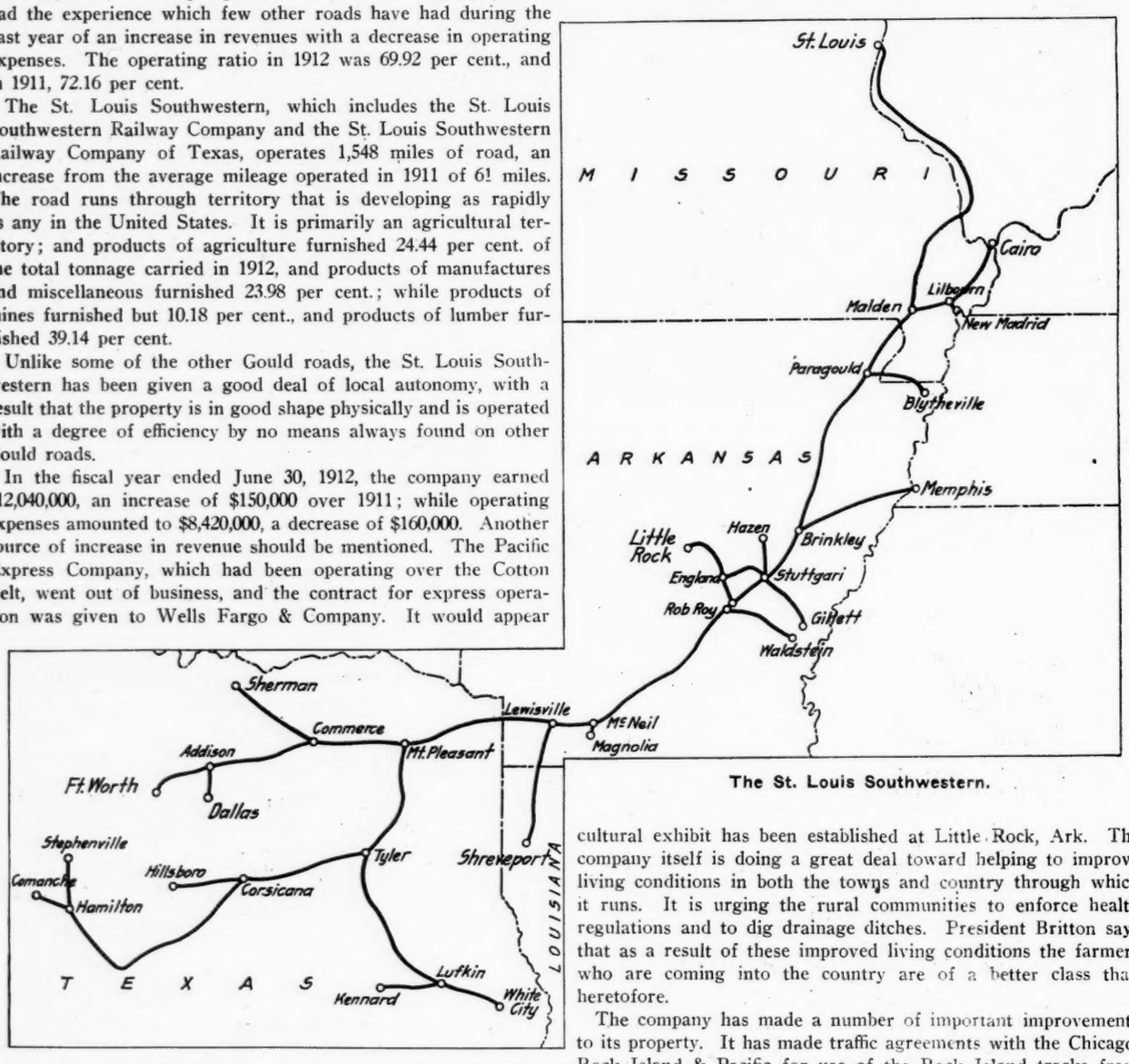
The St. Louis Southwestern, which includes the St. Louis Southwestern Railway Company and the St. Louis Southwestern Railway Company of Texas, operates 1,548 miles of road, an increase from the average mileage operated in 1911 of 61 miles. The road runs through territory that is developing as rapidly as any in the United States. It is primarily an agricultural territory; and products of agriculture furnished 24.44 per cent. of the total tonnage carried in 1912, and products of manufactures and miscellaneous furnished 23.98 per cent.; while products of mines furnished but 10.18 per cent., and products of lumber furnished 39.14 per cent.

Unlike some of the other Gould roads, the St. Louis Southwestern has been given a good deal of local autonomy, with a result that the property is in good shape physically and is operated with a degree of efficiency by no means always found on other Gould roads.

In the fiscal year ended June 30, 1912, the company earned $12,040,000, an increase of $150,000 over 1911; while operating expenses amounted to $8,420,000, a decrease of $160,000. Another source of increase in revenue should be mentioned. The Pacific Express Company, which had been operating over the Cotton Belt, went out of business, and the contract for express operation was given to Wells Fargo & Company. It would appear that a more favorable contract had been made with Wells Fargo & Company than the old one with the Pacific Express. Express revenue accruing to the St. Louis Southwestern totaled $263,000 in 1912, an increase of $56,000, or 27.23 per cent., over 1911. After the payment of rentals and fixed charges there was a balance available for dividends of $1,620,000, which is more by $400,000 than the balance in 1911. A semi-annual dividend of 2 per cent. on the preferred stock was paid in January, 1912, and in June the dividend rate was raised to 5 per cent. annually by the declaration of a 2½ per cent. semi-annual dividend, payable July 15. This would leave a surplus for the year of *$720,000.

This showing is for the combined property—the St. Louis Southwestern and the Texas company. As a matter of fact, the lines in Texas have never paid. They were even, in 1912 a drain on the parent company, and it is by no means creditable to Texas that this is the case.

The prosperity of the Cotton Belt in the past year and for a number of years past has been due to good crops, rapid agricultural development, and improved methods of farming and of living conditions in the territory traversed by the road. President Britton especially mentions the work of the United States government farm demonstration service. There are 64 men employed in this work in Arkansas alone, and a permanent agricultural exhibit has been established at Little Rock, Ark. The company itself is doing a great deal toward helping to improve living conditions in both the towns and country through which it runs. It is urging the rural communities to enforce health regulations and to dig drainage ditches. President Britton says that as a result of these improved living conditions the farmers who are coming into the country are of a better class than heretofore.



The St. Louis Southwestern.

The company has made a number of important improvements to its property. It has made traffic agreements with the Chicago, Rock Island & Pacific for use of the Rock Island tracks from Brinkley, Ark., to West Memphis, 65 miles; and since the Cotton Belt owns a one-fifth interest in the Memphis union station, which was opened for operation on April 1, 1912, the company now runs its own passenger trains into this union station.

A union terminal station is to be built at Dallas, Tex., in which union terminal the St. Louis Southwestern has a one-eighth interest. The freight facilities at St. Louis are nearly completed and will be in operation in a short time. The company is also planning to build in the immediate future a freight house, team tracks, etc., at Fort Worth, Tex.

During the year $2,114,000 was spent for additions and betterments to roadway and structures, and $1,222,000 for equipment, making a total of $3,336,000. Of the more important additions

* The company paid its dividends out of profit and loss.

and betterments may be mentioned an expenditure of $1,440,000 for right-of-way and station grounds, $220,000 for station buildings, and $135,000 for ballast.

Although the Cotton Belt carries such a large proportion of light traffic, which does not readily permit of heavy carloading, the average train load on the entire system in 1912 was 341 tons, an increase of 21 tons over the train load in 1911. On the Southwestern, exclusive of the Texas lines, the train load was 447 tons in 1912, as against 424 tons in 1911. The total number of tons carried one mile in 1912 amounted to 836,000,000, an increase of 1.39 per cent. over 1911. The average haul remained almost exactly the same in the two years, being 245 miles. The average receipts per ton per mile were 1.07 cents in 1912 and 1.08 cents in 1911. The increase of 1.39 per cent. in ton mileage was handled with a decrease of 3.96 per cent. in freight train mileage and a decrease of 3.96 per cent. in freight locomotive mileage. A notable gain in operating efficiency was made in the decreased proportion of empty car mileage. On an average there were 27.39 cars per train in 1912 and 26.18 in 1911. This is a gain of 4.62 per cent. The average number of loaded cars per train was 19.41 in 1912 and 17.47 in 1911. This is a gain of 11.10 per cent. in loaded cars per train, with a decrease of 9.43 per cent. in the number of empty cars per train.

During the year the company sold $7,071,000 first terminal and unifying mortgage bonds, paying off certain notes and equipment obligations; so that the total net increase in funded debt was $5,124,000. At the end of the year the company had $3,330,000 cash on hand, which is more by $2,110,000 than the cash on hand at the beginning of the year; and during the year the company paid off the total loans and bills payable amounting to $950,000; so that at the end of the year total working liabilities amounted to $1,557,000. There was a discount on the bonds sold, which was charged to profit and loss, amounting to $1,234,000. By charging this to profit and loss the company now carries no extinguished discount on securities on its balance sheet.

The decrease in expenses during the year was due to a decrease of $323,000, or 17.94 per cent., in maintenance of way, and a decrease of $54,000, or 1.42 per cent., in transportation expenses. These decreases were in part offset by an increase of $108,000, or 5.24 per cent., in cost of maintenance of equipment, and an increase of $76,000, or 16.26 per cent., in general expenses. There is an increase of 24.16 per cent. in taxes, which seems an unreasonable increase, notwithstanding the fact that the land values, of course, are rising very rapidly in many parts of Arkansas and other territory through which the road runs.

The following table compares the figures for operation in 1912 with those in 1911:

	1912.	1911.
Average mileage operated	1,548	1,487
Freight revenue	$8,971,114	$8,866,846
Passenger revenue	2,300,986	2,393,140
Total operating revenue	12,042,543	11,888,037
Maint. of way and structures	1,477,069	1,799,916
Maint. of equipment	2,172,269	2,064,046
Traffic	479,154	445,784
Transportation	3,744,143	3,798,103
Total operating expenses	8,419,415	8,578,155
Operating income	3,150,072	2,930,120
Gross corporate income	4,047,915	3,457,004
Net corporate income	1,617,619	1,215,823
Dividends	895,214	.....
Balance	722,405	.....

NEW BOOKS.

Elements of Drawing. By George F. Blessing, M.E., Ph.D., and Lewis A. Darling, E. in M.E. Bound in cloth. 176 pages; 6 in. x 9 in. Published by John Wiley & Sons, New York. Price $1.50.

The purpose of this book is to present a course of instruction in mechanical drawing for beginners who intend to pursue a course in engineering or to prepare themselves for commercial drafting work. The work outlined in this book is largely the same as that required of first year students in Cornell University. Special attention is paid to the proper use of drawing instruments, to correct methods of lettering and to drafting room practice. Considerable space is also devoted to isometric drawing.

Letters to the Editor.

PRESIDENT W. G. LEE ON RELATIONS OF RAILWAYS AND EMPLOYEES.

Cleveland, Ohio, September 11, 1912.

To the Editor of the Railway Age Gazette:

I have just read a letter in your issue of August 22, under the heading, "A General Manager's Remedy for Collisions," in which the said general manager lays the blame for accidents largely on labor organizations. Among other things, he recommends that the superintendent be given the authority of general manager over his division, in so far as the handling of employees is concerned, and that there should be no appeal from the superintendent's decision. He also suggests that the directors give the general manager full power to deal with the labor organizations and instruct them to cancel all existing agreements and put others into effect showing the rates of pay they will receive from the time they go on duty until relieved, with a minimum of 10 hours in 24.

In my opinion it is quite easy to guess the school from which this general manager came. In all probability he had some official connection with a railway thirty or forty years ago when the plan suggested by him was in full effect. The conditions to-day that he objects to were brought about almost entirely by abuses of railway officials. For instance, the general manager says that "for years the cause of more delays, accidents, etc., than anything else" has been "seniority." No one is more to blame for "seniority" than the railways themselves. If a merit system could be conducted with something approaching real justice, no one could reasonably object to it. But it wasn't so conducted in the past and I do not think all railway officials have yet become entirely free from bias or favoritism. There were too many promotions made for personal reasons, and a good many of the better positions were held by relatives, friends or favorites of the officers. Such a condition was surely not conducive to efficiency or greater safety in operating trains.

Some railway officials seem to give more thought to finding flaws in the methods of labor organizations or how to violate some part of the working agreement governing employees, than to improving the service and lessening accidents. Instead of providing more safety devices to make the work of employees safer, and to make the transportation of freight and passengers safer and more comfortable, some operating officers apparently are more deeply engrossed in gaining more authority and making records for themselves. In the matter of safety devices, decent wages and common comforts, about all that the employees enjoy to-day they had to fight for. In my opinion the managing officials of railways have not in the past shown the proper spirit of co-operation to produce the greatest efficiency. With this lack of consideration, can any one blame the employees for using their only instrument—organization—to obtain betterments?

This general manager wants the authority of the directors to deal with labor organizations. If railways were operated merely as devices for the use of general managers with which to make records for themselves, the suggestion would not be a bad one, but as railways are supposedly operated for profit, and as the directors are the owners, or representatives of the owners, they probably feel that they ought to have something to say in matters vitally affecting the earnings of the company.

He suggests that superintendents be given the authority of the general manager in matters pertaining to employees. This would merely be a step backward, undoing what it has taken years to accomplish to the mutual interest of employer and employee.

He would cancel wage agreements and revise them to his own liking. He intimates thereby that he would do so regardless of the voice or rights of the men. When he contracts for supplies he must reach some agreement with his supply man satisfactory to both parties. I may be biased on this point, but it seems to me

that the employees of a railway are as important a factor in its operation as supplies. In my opinion the wisest general manager is the one who recognizes the labor organization as such and meets and deals with it in as nearly a co-operative spirit as possible. There is no denying the strength of these organizations, and they will not, within their power, tolerate some of the arbitrary and unreasonable conditions imposed upon the men in the past. There are some among our members who are irrational and demand unreasonable things, but they are few as compared with the great mass who only want a square deal and a fair share of the earnings that they help to produce. The intelligent manager who deals with his men on that basis and sees that instructions to his subordinates to that effect are rigidly carried out, is the one who will make the greatest headway for himself and for this company.

W. G. LEE,
President, Brotherhood of Railroad Trainmen.

A MASTER MECHANIC ON THE REMEDY FOR ACCIDENTS.

——, ——, Aug. 27, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

After reading "A General Manager's Remedy for Accidents" published in your issue of August 23, I want to say that I am glad to know that at least one man has had the nerve to get down to the root of this much discussed question and so declare himself in print. Hundreds of columns have been written and printed attempting to explain how to avoid accidents, but the general manager who wrote the article above referred to has hit the nail squarely on the head, in a concise manner, and leaves little room for argument, except, perhaps, from members of labor organizations.

Personally there is one point on which I disagree with this general manager, and this is about making the superintendent the supreme authority on the division. My opinion is that a transportation official, as a rule, is no more capable of judging the ability of an engineer than is a master mechanic capable of passing upon the qualifications of a conductor. And, in making this statement, I have no intention whatever of belittling the ability of any superintendent. But the education of an engineer being along mechanical lines it necessarily follows that he should be dealt with by some person who is similarly informed.

The present practice, at least on most roads, is for the engineers to meet and formulate agreements with general managers. Many of the concessions that are granted are not practical from a mechanical standpoint. Therefore, I say let the schedules and all other agreements, if we must continue to have them, be entered into by the engineers and the head of the mechanical department, and then permit some mechanical official to say when a certain engineer shall or shall not be discharged.

While I would like to see most of the ideas carried out, as recommended by "General Manager," still I do not believe we can ever expect the present contracts to be abrogated or, in fact, even modified. The engineers, by reason of the powerful organization that is behind them, now have the railway companies at their mercy, and I doubt if they would release their hold a particle. At any rate this, if ever attempted, could only be accomplished after a struggle that would paralyze railway traffic for months.

There is no doubt in my mind but what seniority and organization are responsible for most of our worst accidents today. Seniority places a man in a position that he is about as capable of filling as a billy goat of singing tenor in a church choir, and the organization that is behind him keeps him there. Discharge the man for incompetency and you are immediately besieged by all the grievance men along the line to have him reinstated. And no matter how firm you may be in your stand that the man shall not be returned to the service of the company you finally receive an order emanating from the general manager to put the man back to work without prejudice, although the master mechanic may be satisfied in his own mind that the man is wholly unfit to fill the responsible position of engineer.

No doubt all of us can recall cases where accidents have occurred, resulting in great loss of life. It is shown that the engineer was at fault for gross negligence and he is discharged. In a few months he is reinstated and hundreds of precious human lives are again entrusted daily to his care and keeping. If he received his just dues he would be serving a term in the penitentiary for manslaughter and be barred from future employment as an engineer if he was ever fortunate enough to secure his release from the bastile.

And a few more words while we are on this subject of organization. Railway officials periodically rush into print with interviews wherein they deplore the spread of anarchy, socialism, etc. I make the statement, and defy it to be satisfactorily contradicted, that railway officials themselves, by reason of their actions, are alone responsible for what they believe to be the appalling conditions that confront them. The man who belongs to an organization can get what he wants, either in the way of an increase in wages or better working conditions, but the man who is unfortunate enough not to be affiliated with an organization must take what the company sees fit to mete out to him in the way of wages, or work amidst such surroundings as the company provides, no matter how uncongenial they may be, bearing in mind, of course, that he has one more privilege than a soldier, that of resigning. The man with the organization back of him, if discharged, has all the influence and power of his organization to secure his reinstatement. The man who is not so fortified is dismissed on the slightest provocation and there is no one to plead his cause. In other words, railway officials, while depreciating the spread of anarchy, socialism, unionism and organization, do nothing but cater to the men who are organized. For railway officials to learn to tote as fair with men who are not members of a labor organization as with men who are members, will do more to promote harmony and dispel dissatisfaction than anything I know of.

I will go a step further than "General Manager." I will make the prediction that inside of ten years, if railway officials do not wake up and respond to the needs of the hour, a law will be passed requiring every railway engineer to hold a government license. Then when a wreck occurs resulting in loss of life a board of inquiry composed of government officials will pass upon the responsibility for that wreck. If it is shown that the engineer was negligent his license will be revoked, and he can never run an engine again. We are coming to this just as surely as the sun rises tomorrow morning. Why should the railways wait until such stringent laws are passed before starting to carry out such a plan? It might not be prudent for railways to enter into an agreement that they will not employ a man simply because he was discharged on some line because of an accident. But a partial remedy for the evil is, when a man is discharged be sure you are right and then make it stick for all time, so far as that particular road is concerned. If an engineer knows he is going to lose ten or twenty years' seniority on account of being responsible for an accident he will be more careful.

These remarks, like those of "General Manager," may sound revolutionary. But why quibble and beat around the bush in an effort to lose sight of conditions which we must face sooner or later? A revolution is bound to come, so let's "revolute" and be done with it.

MASTER MECHANIC.

GERMAN RAILWAY EARNINGS.—The gross income derived from the Prussian-Hessian railways in 1911 amounted to $559,601,500, an increase of $35,860,500 as compared with 1910. This increase would probably have been considerably larger if, during last summer, the railway tariff for fodder had not been greatly reduced in order to help agriculture, owing to the serious drought. The great increase in the railway freights is due partly to the rivers having been very low and unable to take the usual amount of traffic.

ASPECTS OF STEAM RAILWAY ELECTRIFICATION.

Important Advantage of Electric Locomotive Is Ability to Haul Heavy Trains Over Grades at Same Speed as on a Level.

BY C. L. DE MURALT, M. AM. SOC. C. E.,
Professor at the University of Michigan.

Let us see what has thus far been accomplished in trunk line electrification and what is likely to be done in the future.

We have today at least seven prominent steam railways that are using electricity as motive power on one or more of their main line divisions.*

(1) The Baltimore & Ohio, at its Baltimore terminal.

(2) The New York Central, at its New York City terminal.

(3) The New York, New Haven & Hartford, at its New York City terminal and at the Hoosac tunnel.

(4) The Pennsylvania, at its New York City terminal, and on parts of the West Jersey & Seashore.

(5) The Great Northern, at the Cascade tunnel.

(6) The Grand Trunk, at the Sarnia tunnel, under the Detroit river.

(8) The Michigan Central, at the tunnel under the Detroit river.

With the exception of the West Jersey & Seashore, every one of these electrifications was caused through the presence of a tunnel, which made further operation by steam locomotives either difficult or impossible. Whatever economies in operation were secured through the use of electricity may be said to have been incidental in all these cases.

Does this mean that electricity will be restricted to places where tunnels form a hindrance to steam operation? A careful examination of the matter shows nothing to confirm such a view. Smokelessness is only one of the advantages of electric traction. As matters stand today it will hardly be considered its most valuable one. There is one that is likely to prove of much greater importance. It is the fact, that the electric engine possesses inherent qualities, which make it a much more powerful traction machine than its steam rival. To show just how this characteristic has already been utilized and to what extent it is likely to influence further developments is the purpose of this article.

The work which any given engine can do is dependent on three things, tractive power, boiler power and engine power, and it is limited in three ways.

(1) The tractive power is limited by the weight of the engine, or rather by that portion of the weight which is placed on the driving wheels. Any increase in weight on drivers means a proportional increase of tractive power, and for any given weight on drivers there is a certain maximum power which the engine can exert, and beyond which it must necessarily slip its wheels.

(2) The size of the boiler determines the quantity of steam which can be produced in a given time, and thus limits the steam producing or boiler power. If the engine uses more steam than the boiler can produce, the boiler pressure will fall and the engine will then be unable to turn the wheels.

(3) The capacity of the cylinders in a steam engine, or of the motors in an electric engine, limits the mechanical or engine power. If these parts are not sufficiently powerful, then the engine will be stalled, even while utilizing to the utmost a full pressure of steam and while yet unable to slip the drivers.

It may be said at once that the last is in general an unpardonable fault for any engine to have, because it is an absolutely needless sacrifice of a good part of its working capacity. With proper care in the design of its steam cylinders, or proper choice of the electric motors, it is always feasible to make the engine power in excess of either the tractive power or the boiler power, or both. The limit to the work which can be done by a well designed engine need therefore never lie in its motor part. It is always due either to insufficient tractive power or insufficient boiler power.

On these two points the electric engine shows its superiority over the steam engine. The electric engine has the boiler in the power house, and its size can thus be determined without reference to the limitations which are imposed on the boiler of the steam engine by the physical characteristics of the track and of the fireman. In other words, by proper design the limitations of the boiler power can be entirely removed in any system of electric traction.

Similarly, we find that the limitations of tractive power may be practically eliminated wherever electricity is used, because the electric motor lends itself to subdivision of power with such ease, that it is quite possible, in case of necessity, to turn any desired number of axles into driving axles, and thus to utilize any desired part of the weight, up to the full weight of the train, for tractive purposes. The tractive power which is thus made available is away beyond anything that is likely to be demanded in railway work.

Now let us see how these two characteristics of the electric engine may be utilized.

Our contention is, that electricity is peculiarly suitable for the relief of all congested spots on the present steam roads. We have two main cases of congestion, namely, terminals and ruling grades.

We started by saying that the electrification of the New York terminals of the New York Central, the Pennsylvania and the New Haven railways was largely caused by the necessity of avoiding smoke in the tunnels that form a part of these terminals. But it would be wrong to assume that the matter stopped there. The men who had charge of these installations fully realized the other advantages which were thus incidentally placed at their disposal. In such cases it is especially the removal of the limitations on tractive power which is of considerable value.

It is a fact well known to all superintendents of motive power that it is difficult to make a fast schedule in dense suburban passenger traffic, even with the most powerful steam engines, especially designed for such service. The reason is that with steam locomotives there is a distinct limit to the amount of weight that can be placed on the drivers. From this results a limit to the tractive power, and consequently a limit to the ease with which heavy trains can be started and brought up to the speed. Even the highest obtainable rate of acceleration is too low to give a really satisfactory schedule speed when stops average about one mile apart. Furthermore, the number of cars that can be hauled in such a train is distinctly limited.

Electricity changes the situation completely. Any number of axles can be equipped with electric motors, and thus the tractive power can be raised to any desired amount. In actual practice an electric train can readily be accelerated two or three times as fast as even a light steam train, and there is practically no limit to the number of cars that can be placed in an electric train. The congestion is thus relieved in three ways, first by the possibility of using larger trains, second by the chance of higher schedule speeds, and third by the greater ease with which

* [As our readers well know, several railways have adopted electricity as motive power for suburban or interurban service. For example, the Southern Pacific electrification of suburban lines in Oakland and adjoining suburbs was described in the issue of September 13, 1912. The same system is now electrifying a number of lines in the vicinity of Portland, Ore. The West Shore has electrified a portion of its line between Utica and Syracuse, N. Y., operating passenger service in conjunction with steam freight service as described in the *Railway Age* of June 21, 1907.—EDITOR.]

the trains can be moved out of each other's way, that is to say, by the possibility of decreasing the interval between trains. In actual practice all three methods are usually combined with resultant satisfaction to passengers as well as the railway.

In the case of congestion due to severe grades, on otherwise level or low-grade lines, the conditions are reversed. In such instances the maximum tractive power is usually quite sufficient; in other words, the obtainable acceleration is satisfactory, but it is the boiler power which causes trouble. In order to lift the train up the grade, the engine must consume more and more steam until a point is reached when the boiler is unable to produce any longer what the engine requires. Then, either must the train weight be reduced, or its speed, or both. This is what actually happens on the ruling grades of most of the lines crossing the Alleghenies, the Rockies, and other mountain ranges. Helper engines mitigate the nuisance to a certain extent, but there is a limit to the number of helpers that can consistently be used on one train, and when this limit is reached, the trains are made lighter at the bottom of the grade, or their speed is cut down, or both.

Here, again, we find that the use of electricity completely changes the situation. There is no limit to the power which the boilers in the far-off power house can produce, and this power can very readily be carried to the engines in the form of electric current by means of the third rail or overhead contact line. Thus it is possible to concentrate sufficient power in an electric locomotive to take any train up the grade in the same composition in which it arrives at the bottom of the grade, and with the proper type of motor this can be done at the same speed at which it is run on the level. The congestion produced by the grade is thus effectively removed. In fact one might almost say that for electric operation the vertical profile of a road loses all of its terrors, and trains can be taken over the most broken profile almost as well as over the level road.

We see, therefore, that the excess power of the electric engine can be made useful in at least two ways. The electrification of terminals is likely to make further steady, but comparatively slow progress. As a matter of fact, there are not very many places where terminal congestion has reached such a state as to make the use of electricity necessary, or even very important. The electrification of heavy grades, however, is destined to find more and more favor, especially because the business of the country is on the increase and any congestion now existing is therefore likely to be aggravated in the near future. At the Cascade tunnel of the Great Northern a heavy grade has been electrified in addition to the tunnel, and the results there obtained are certainly quite encouraging.

As regards the electric system to be used, too much importance has been attached to this subject in the past. There are today at least three well established electric systems, namely, the continuous current or direct current system, the single-phase alternating current system, and the three-phase system. Any of these can no doubt be used to electrify almost any service found on American roads. Which is the best for any given case can readily be determined by men who are expert in such matters. Generally speaking the continuous current system will probably be found best suitable in terminal electrification work and the three-phase system in grade work. The single-phase system, for which rather extravagant claims have been made at times, does not seem well suited for work of the heavy kind. It is true that Mr. Murray claims that the New Haven saves 15 per cent. by the use of the single-phase system, but his claim has in no way been substantiated, and those who know believe that the case is the other way round, and that the New Haven would be better off if it used one of the other two systems. But this is indeed not a vital point. Just as there are many different types of steam engines, and at least three types of approved valve gears, so is there room for many different kinds of electrical motors.

The fact which is important is that in the electric locomotive of proper design we have an engine of much greater working capacity than can ever be obtained in a steam engine. This greater capacity can be used, either to give greater acceleration in terminal work, or to move heavier trains at higher speeds over ruling grades. The latter employment in particular is likely to prove of great value in the case of roads where a severe grade produces a congestion, and thus a decrease in the traffic capacity of the whole line.

In a future article we will investigate whether grade reduction, or the use of Mallet engines, or both together, can afford as great a return on the capital invested, or offer the same operating advantages as electrification.

PROPOSED FEDERAL FULL-CREW LAW.

On April 8, 1912, circular No. 31 on the above subject, was addressed to the railways by the Special Committee on Relations of Railway Operation to Legislation asking for the cost of compliance with the bill pending in the house of representatives, requiring all freight trains of twenty-five cars or more to have a crew consisting of an engineer, fireman, conductor and three brakemen. Replies to this circular were received from 143 operating companies, operating 195,049 miles of road.

A summary of the replies has been tabulated by the committee as follows:

Trains affected by existing state laws, per annum..	678,661	
Additional trains affected by proposed federal law in states now having full-crew law, per annum....	468,483	
Trains affected by proposed law in states now having no full-crew law, per annum.....	3,211,056	
Total trains affected by proposed federal statute, per annum		4,358,200
Cost of compliance with existing state laws, per annum	$1,797,590	
Additional cost of compliance with proposed law in states now having full-crew law, per annum....	1,342,237	
Cost of compliance with proposed law in states now having no full-crew law, per annum.....	10,255,791	
Total cost per annum of compliance with proposed statute		$13,395,618

It will be noted that in the states in which there already is a full-crew law affecting freight train crews, the additional cost entailed by the proposed federal bill will be $1,342,237 per annum, or approximately 75 per cent. of the cost of compliance with the state laws already in effect.

In states where no such law now exists, the estimated cost of compliance with the proposed federal act will be $10,255,790 yearly.

It will be noted further, that the total cost of compliance with the proposed federal bill will be $13,395,617 a year, an increase of $11,598,028 over the annual cost of existing state laws.

In return for this expenditure, which is 5 per cent. on $267,912,355, the committee states, no additional safety will be provided for the public or employees; but, on the contrary, in many instances the operation of the trains will be rendered less safe by reason of the multiplication of useless employees.

The bill (H. R. 21219) was introduced on March 2, last, by Representative Sabath of Illinois, and was referred to the committee on interstate and foreign commerce. Its author seems to have intended to require three brakemen on all freight trains, however short, the essential clauses being worded as follows:

"To compel railway companies . . . to equip *all* of its freight trains. . . . No railway shall equip any of its freight trains with a crew consisting of less than an engineer, a fireman, a conductor, and three brakemen. . . . This Act shall not apply on lines where said freight trains are so operated shall consist of less than twenty-five cars, it being the purpose of this Act to require all railways engaged in interstate commerce, *whose line or lines are engaged in hauling freight trains consisting of twenty-five cars and more,* to equip the same. . . ."

The bill provides for a penalty for each offense not less than $100, nor more than $500, and that each freight train so illegally operated shall constitute a separate offense.

SEVENTH STREET VIADUCT AT DES MOINES, IOWA.

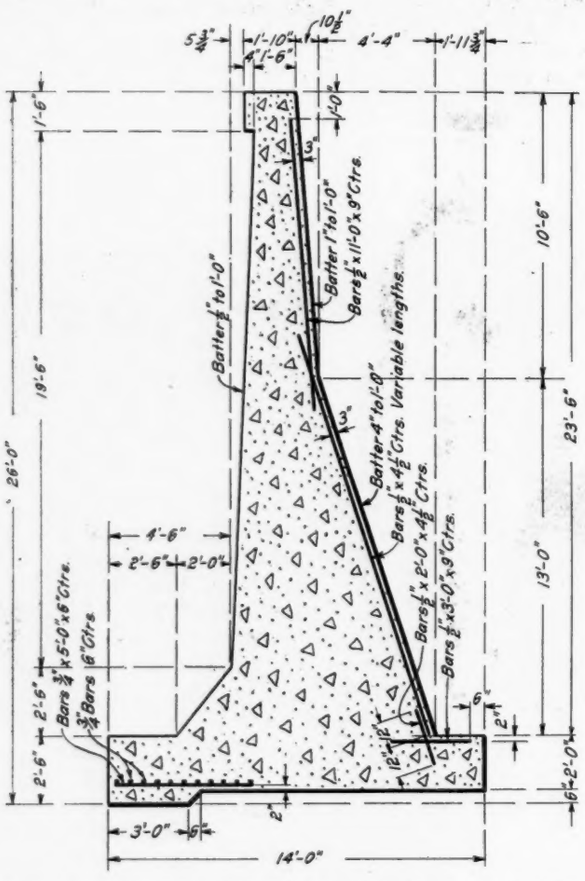
Description of Interesting Details of the Building of This Structure of Steel Covered with Concrete for Appearance.

The Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Minneapolis & St. Louis, and the Des Moines Union own tracks in the city of Des Moines, Iowa, which are roughly parallel and which cut the city from east to west close to the center of the business section. In addition to the owning companies, the Chicago Great Western, the Chicago, Milwaukee & St. Paul, and the Wabash operate over these tracks, making a large number of train movements. All street crossings in this vicinity are at grade, and the inhabitants of the city maintain that the development of the residential section south of the railway tracks has been seriously hindered by the delay and danger in crossing the tracks on any of the streets connecting the business section with the south side. The matter of separating grades was agitated in the city as much as 18 years ago, and since that time several schemes both for elevating the tracks and for carrying the streets across on viaducts have been considered. Any plan which involved the elevation of all tracks was considered prohibitively expensive by the roads, as they maintained numerous industry and team tracks, freight house connections and transfer tracks. The agitation for some improvement was so great, however, that negotiations were begun for the construction of a viaduct at some convenient point which would serve the whole district south of the railways. Although Seventh street was not the most important thoroughfare crossing the tracks, its location made it best suited for the building of such a viaduct and by improving this street at the south end of the new viaduct a very satisfactory connection between the business district and the south side can be secured.

The city at first insisted on a concrete arch structure over all the tracks, but as the viaduct had to be more than one-third of a mile long the cost of this type of construction was considered too great by the roads. It was also urged against this plan that it would be impossible to make changes in the structure which might at any time be made necessary by a change in tracks or buildings. The necessity for frequent changes of this kind which cannot be foreseen is shown by the fact that after the first designs of the viaduct were approved the Burlington decided to build a new freight house at a location directly under the proposed viaduct and a change in the plans was made necessary on this account. A steel viaduct was best suited to the conditions from the standpoint of the railways, but the appearance of such a structure would not have satisfied the city, so a compromise was effected in the design of a steel structure encased in concrete. The span lengths are very irregular and in the longer ones the load is carried by longitudinal girders with transverse floor beams supporting concrete floor slabs, while in the shorter ones the concrete slabs are used to span between the cross girders over the columns. Facia girders of uniform depth are carried alongside the structure for its entire length to give it a uniform appearance. There were 1,500 tons of steel re-

The Cement Gun Used for Coating Posts of the Steel Viaduct, Showing the Appearance of the Form Concrete on the Facia Girder and the Gun Concrete on the Brackets and Cross Girders.

quired for the superstructure, all of which was covered with concrete for protection and ornamentation. The facia girders are finished with recessed panels and large radius fillets over the heavy concrete encased columns which gives the structure almost the appearance of a series of flat concrete arches. A concrete hand rail and concrete lamp posts will further improve the appearance. Work was begun on the sub-structure in July, 1910, and the erection of the steel superstructure was started in the spring of 1911. Considerable delay was occasioned by the cold weather of the two intervening winters, however, so that work has not been carried on continuously for the entire time indicated by the above dates. The structure is now practically ready for use and as soon as the approaches are finished will be


Batter 1" to 1'-0"
Batter 4" to 1'-0"
Bars ¾" x 11'-0" x 9" Ctrs.
Bars ¾" x 4'-4" Ctrs. Variable lengths.
Bars ¾" x 2'-0" x 4½" Ctrs.
Bars ¾" x 3'-0" x 9" Ctrs.
Bars ¾" x 5'-0" x 6" Ctrs.
Bars ¾" 6" Ctrs.
14'-0"
3'-0"

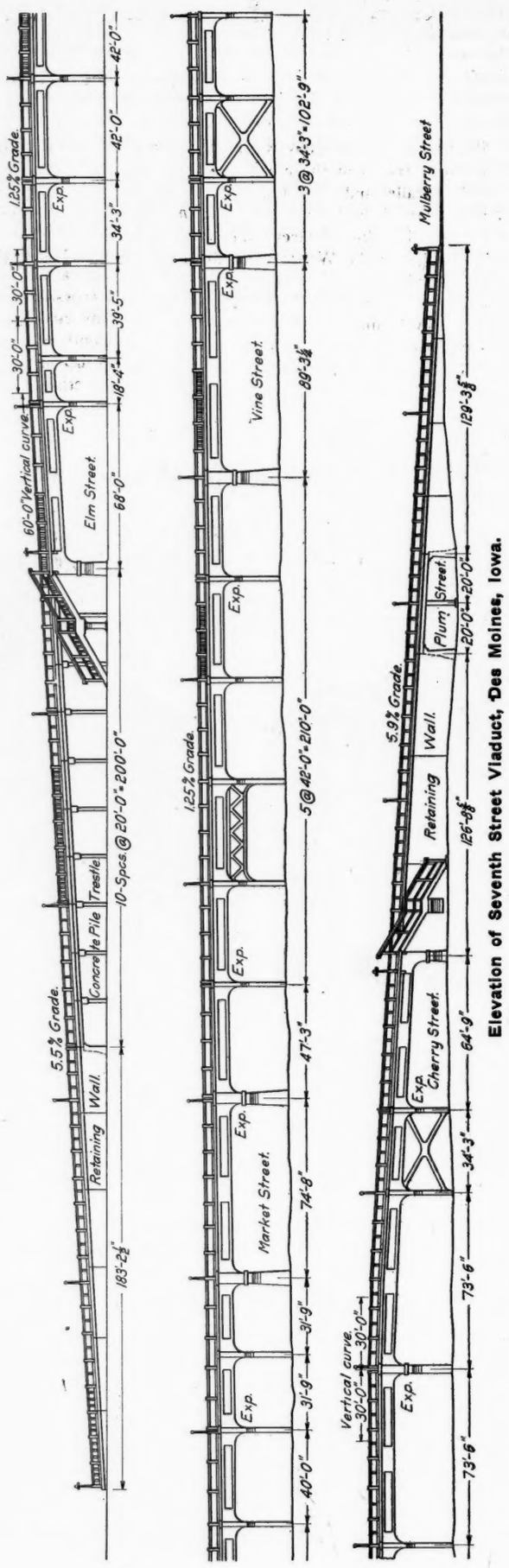
Typical Cross-Section of Retaining Wall for North Approach of the Seventh Street Viaduct.

turned over to the city. It has cost the four owning companies about $240,000.

GENERAL DETAILS.

The viaduct is 1,796 ft. 8 in. long. Beginning at the south end it consists of 183 ft. 2½ in. of approach on fill between retaining walls, 200 ft. of approach on concrete pile bents, 24 spans of various lengths aggregating 1,117 ft. 5¼ in., and 296 ft. ¼ in. of approach on fill between retaining walls, the latter section including the crossing of one depressed street 40 ft. wide. The south approach is on a 5.5 per cent. grade for a distance of 486 ft., and the north approach rises on a 5.9 per cent. grade for 468 ft. The remainder of the structure is on a 1.25 per cent. grade rising northward.

The retaining walls are of a semi-reinforced design, a typical cross section of which is shown in one of the drawings. The toe of the footing is reinforced with ¾-in. bars in both directions and surface reinforcement of ½-in. bars is provided along the inner face. The wall along the south approach is carried on creosoted pile footings, and the one at the north end reaches

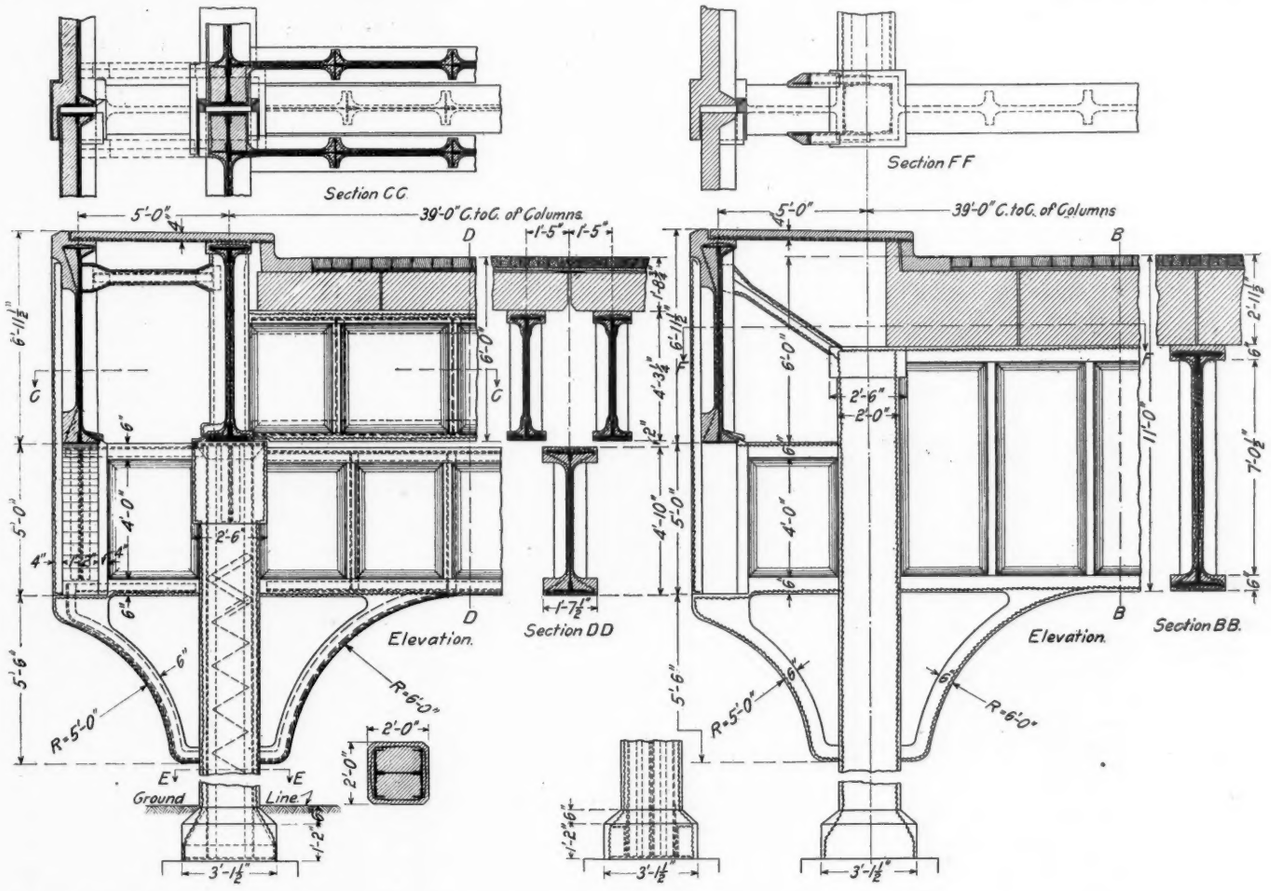


Elevation of Seventh Street Viaduct, Des Moines, Iowa.

a maximum height of 26 ft., the footings being carried down to solid foundation.

The concrete piles used under the south approach have a maximum length of 39 ft., and are 14½ in. square. They are reinforced with No. 23 American wire netting having a 4-in. mesh with twelve ¼-in. longitudinal rods and ½-in. rods in each corner. The sides are not battered, and the point is only 8⅜ in. long. The ¼-in. rods are brought together and tied with No. 14 wire as a reinforcement for the point. The piles were cast on the ground and allowed to season two months before driving. Eight piles were driven in each bent and were capped with concrete beams 3 ft. deep and 2 ft. 6 in. thick, extending down over the pile heads 1 ft. These beams are reinforced with fourteen ¾-in. longitudinal bars and three sets of ½-in. transverse bars. The bents were driven 20 ft. center to center and support concrete slabs 20 in. thick. The piles were driven to refusal with a hammer weighing 2,800 lbs., the maximum penetration being 24 ft. It was necessary to start the piles by a puddling or churning process, because the driver leads were only about 40 ft. high, and the unusual weight of the piles made it unsafe to use higher leads. An ordinary driver was heavily braced to enable the leads to carry the weight of the concrete piles, the bracing being shown in one of the photographs. Before starting a concrete pile, a wooden pilot pile was driven about 8 ft. and pulled. A stream of water was then turned into the hole made by this pilot pile. The concrete pile was then swung into position between the leads and by churning the pile up and down with the line from the hoisting engine it was made to sink in far enough to allow the hammer to get a good fall. A cushion of rubber hose and rope was used over the pile heads during driving to prevent shattering and little trouble was experienced.

The columns supporting the principal section of the viaduct are carried down a maximum of 16 ft. to gravel foundation. In some cases the steel columns were carried as much as 7 ft. below the ground level and are supported at that elevation on concrete footings. The steel columns below the ground were encased in concrete before the excavation was back filled. The columns are latticed plate and angle sections encased in concrete to 2 ft. square, the steel being covered with No. 7 American triangular wire mesh. The columns are spaced 39 ft. apart center to center in each bent and support cross girders which carry the floor slabs either directly or by longitudinal girders and floor beams. In the long spans requiring longitudinal girders floor beams were connected to the web of these girders for the support of the floor slabs. The facia girders are carried on cantilevers outside of the columns.



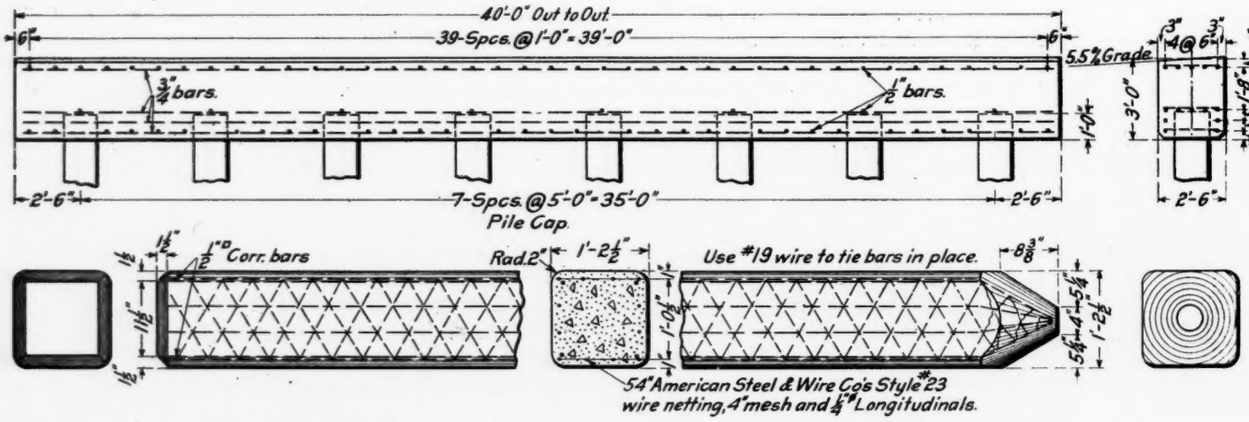
Longitudinal girders with transverse floor beams support light concrete slabs in one type. Transverse girders at panel points carry concrete slabs directly in the other type.

Details of Two Typical Bents in Seventh Street Viaduct.

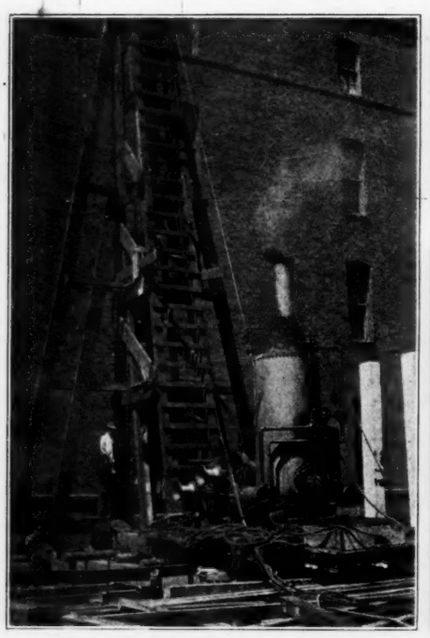
STEEL COATED WITH THE CEMENT GUN.

It was first intended to concrete the steel by form work and plastering, but it was later decided to use the cement gun instead of plastering, which proved a more economical method and produced fully as satisfactory work. In order to secure a good coating of plaster over the steel it was planned to cover all steel members to be plastered with No. 24 gage Mahoning expanded metal, and to paint the lower flanges of all girders to insure the protection of these points which are difficult to plaster by hand. As this painting had been done and most of the expanded metal had been placed before the decision to use the cement gun was reached, the plans were allowed to remain as

they were made, but these additional precautions would not have been necessary if the design had been made with the intention of using the cement gun. It was desired to place a ¾-in. layer of concrete over all steel, but in some places the cement in building up behind the expanded metal forced this metal out from the surface so that to properly cover the mesh the concrete layer had to be made considerably more than ¾-in. thick. The concrete placed by the gun is dry mixed on the board in the proportion of one part cement to three of sand, but owing to the rebound of sand when the stream is turned on fresh surfaces the cement that is built up is in reality considerably richer than 1.3, probably about 1.2. The facia girder covering is reinforced by about four ¼-in. rods in each panel. The expanded metal and the reinforcing was placed from a scaffold mounted on wheels which could be rolled along under the viaduct and the top of which could be folded down to allow it to pass under the cross girders. The nozzle of the gun was operated from a similar scaffold or from a stage swung under the spans when a street or track prevented the use of the rolling scaffold. The mixing board and gun were kept on the ground below the staging, the power for the compressor being furnished by a small motor mounted in a movable power car. An engineer, two laborers to mix the cement and sand, and two men on the scaffold constituted the force which operated the gun. The vertical bracing between two columns in one short span was covered with concrete in forms before the gun work was started. The appearance of this bracing is shown in one of the accompanying photographs, which illustrates the difficulty of preparing forms for such work. The cost by this method would have been almost prohibitive. While the cement placed with the gun does not have as smooth an appearance as that shown in the photograph, it is evenly pebbled and should compare very favorably in appearance with form concrete after it has been exposed to the weather for some time.



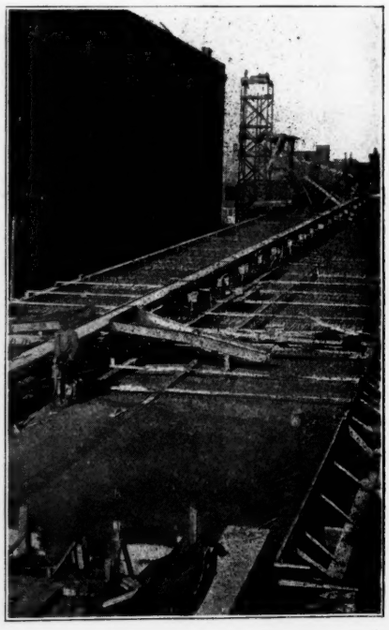
Details of Concrete Pile and Cap Used in South Approach to the Seventh Street Viaduct.



The Extreme Weight of the Concrete Piles Made It Necessary to Brace the Pile Driver Rigidly to Hold It in Place.

Gang Mold for Concrete Balusters.

This Bracing Was Coated with Concrete in Wooden Forms. The Complicated Form Work, However, Made It Advisable to Use the Cement Gun.

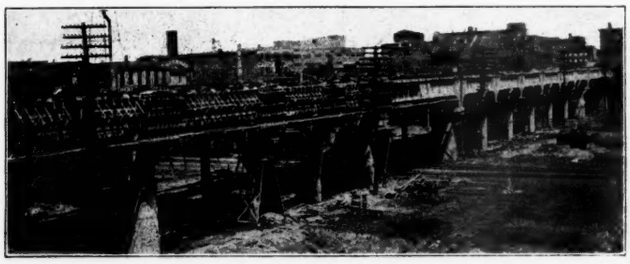


The Concrete Floor Slabs Were Placed by Dropping the Cement from a Tower Into a Longitudinal Trough from Which It Was Spouted to Place.

The girder flanges, the entire outer surface of the facia girders, the pilasters and the columns were all coated in forms. One of the views of the viaduct shows a portion of the facia girder forms still in place. For the main girders and the inside of the facia girders the molded caps on the flanges extend into the edge of the stiffeners, the gun work being used for

the stiffeners and panels. At the expansion ends of the main longitudinal girders a tin box filled with waste was fitted over the slotted holes provided for the expansion movement and the concrete was cast solid around this box.

All form lumber used in this work was Wisconsin pine. It was coated with oil called "form" oil as it was taken from the cars on arrival, and by repeating this treatment each time the lumber was used some of it was good for ten or twelve uses. Some of this lumber was received in the fall and allowed to stand in a pile through the winter, and when it was used in



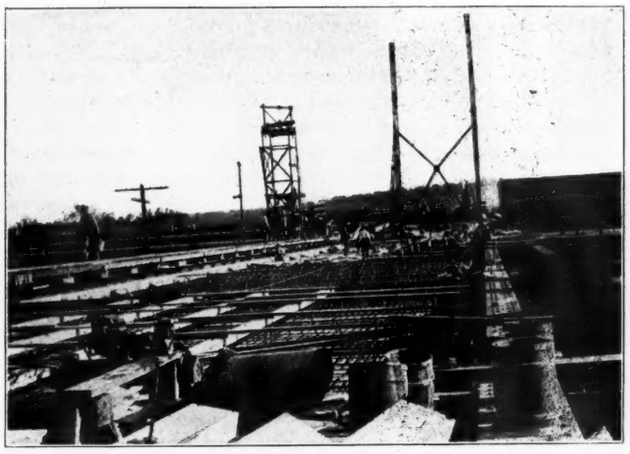
The Viaduct During the Concreting of the Facia Girders, Showing Some of the Forms in Place.

the spring it was found to be perfectly preserved without checking or warping. It only required 75 gal. of this oil, costing 12 cents a gal., to coat all forms used on the work, and the saving effected in lumber was very material.

The floor slabs were all cast in place, some of them being of unusual size. The slabs were made continuous for the width of the structure, about 37 ft., and in five cases a span of 34

Erecting One of the Girder Spans.

ft. was covered by a single slab, in two other cases the span being only 2 ft. less. The largest slabs had a thickness of 30 in. In the long slabs supported on floor beams the floor slabs were placed continuously over the floor beams, except that the reinforcing beams were broken at each point of support, the design being originally prepared with the intention of placing the slabs in sections. The transverse reinforcing bars were continuous over the width of the structure. Expansion joints are provided over the cross girders in the floor slabs and at intervals of about 180 ft. in the sidewalks and other continuous portions. The slab reinforcement consists of ¾-in. square bars in short slabs, and 1-in. square bars in the 34-ft. slabs



Looking Over the Viaduct Before the Floor Was Placed or the Girders Concreted.

placed longitudinally and ½-in. square bars placed transversely. The distributing tower with the longitudinal trough and transverse spouts used for placing these slabs is shown in one of the photographs. The upper surface of the concrete is waterproofed with an asphalt composition. Runways 4 in. x 8 in. were left in the slabs for street railway rails which it

Concrete Pile Trestle Approach.

is expected will be placed in the future. At present these are filled with sand and covered with the roadway pavement.

The roadway over the viaduct is 36 ft. wide between curbs, and is paved with brick on the approaches and creosoted wooden blocks on the 1.25 per cent. grade. This pavement is laid on a 1-in. sand cushion directly on the floor slabs. A pitch filler is used throughout. Sidewalks 6 ft. 9 in. wide are provided on each side of the roadway. Each sidewalk was built as a slab resting on the top of the facia girder, and either on the top of the main girder or the edges of the floor slab.

The reinforcement in the sidewalk slabs is 24 gage Trussit, a ribbed sheet reinforcing product of the General Fireproofing Company, Chicago. This metal reinforcement has a depth of about ¾ in., and is covered by about 3¾ in. of concrete floated in place, and is protected on the lower side by about ¼ in. of cement placed with the gun. A lighting conduit is carried across the viaduct under the sidewalk slab.

Several designs of hand rails were considered, but one, involving only simple square balusters set vertically, was finally agreed on. There are 5,100 of these balusters in the rail and to mold them rapidly and economically six gang molds were prepared which made it possible to cast 200 balusters at one operation. One of these gang molds is shown in an accompanying photograph. The cross boards are arranged to slide between the boards forming the sides of the mold so that they can be removed after each operation for cleaning. The concrete was placed wet and was well puddled about the single reinforcing bar which is used in the center of each baluster. The balusters are 3 ft. 8 in. long, which allows them to extend into the top and bottom rails. The balusters are set directly on the sidewalk slab and the lower rail is molded around them. Forms are then placed for the upper rail which extends down below the top of the balusters, and is bonded to the heavy posts over the panel points by steel dowels previously provided in the construction of the posts. There are 20 single-light standards and six 5-light clusters supported on the posts of this railing. Stairways are provided at convenient streets near each end of the structure, and similar hand rails are carried down these stairways.

The design of the viaduct was prepared under the direction of C. H. Cartlidge, bridge engineer of the Chicago, Burlington & Quincy, who was chairman of a committee representing the four roads interested in the work. The late A. D. Page acted as consulting engineer in this design until his death, since which the work was finished by F. Beckwith, under the direction of Mr. Cartlidge. The field work was in charge of A. L. Morgan, chief engineer of the Des Moines Union, who was made engineer of construction for the four roads. The Phee Construction & Engineering Company, Chicago, had the contract for the substructure and the concrete work. The Des Moines Bridge & Iron Company fabricated and erected the steel work, and A. W. Van Hafften, Minneapolis, had the contract for the paving.

BRIEF IN BEHALF OF WESTERN CLASSIFICATION COMMITTEE.

R. C. Fyfe, chairman of the Western Classification Committee, and W. F. Dickinson, attorney for the committee, have filed with the Interstate Commerce Commission a brief of 470 pages in the proceedings growing out of the suspension of Western Classification No. 51 by the commission at the instance of shippers and many of the western state railway commissions. The greater part of the brief is devoted to a discussion of individual items and rules, ratings and minimum weights of the classification. In a preliminary statement the efforts of the railways to comply with the demands of the Interstate Commerce Commission for a uniform classification are outlined, and the reasons for the large number of changes in the classification are explained. After describing the three classification territories and the organization of the Uniform Classification Committee the statement proceeds as follows:

"The Uniform committee found that it would be necessary to undertake an exhaustive comparison of the three classifications, and the first three months of its work were devoted to making this comparison. After the work of comparison had been completed the rules were taken up for consideration, and following the rules the general descriptions, etc. The work of the committee was prosecuted with great care and careful deliberation. Many conferences were held with the representatives of trade organizations throughout the country, those representatives being requested to obtain and submit wherever possible the views and recommendations of the organization members. The requests for views and recommendations of trade organizations and members thereof covered such features as description of articles, nature of the articles, their constituent elements, the uses to which they are put, how packed for shipment, whether shipped in carloads or less than carloads or both, the extent to which they are "knocked-down" when shipped, the dimensions and weight of the article or package, its weight and value per cubic foot, its value per unit of sale, loading weight per car and whether the article can be loaded in a standard 36-ft. car, whether shipped with other articles in mixed carloads, number of cars shipped per annum, and where the article is produced. Where no trade organizations existed the Uniform committee took up these questions, either in person or by letter, with the manufacturers and shippers. The members of the committee devoted a great deal of time to work in the field, making personal visits to various manufacturing plants and districts in order to secure first-hand information as to actual conditions in the production and shipment of goods in the various industries. Several hundred conferences were held with manufacturers, shippers' associations and individual shippers, and thousands of letters were written in search of definite and accurate information, all of the information secured being duly considered by the committee in formulating its conclusions. After conclusions had been reached the committee as a rule submitted them, before they were adopted, to the interested shippers for approval before they were finally recommended to the several classification committees. From this it will be seen that every possible effort was made by the Uniform committee to secure definite and authentic information on which to base its findings. It seems not out of place in this connection to call attention to the fact that the carriers have already expended over one-half million dollars to defray the expense of the Uniform committee.

"The findings of the Uniform committee were then submitted in printed reports to the several classification committees for consideration. The Western Classification Committee took these findings under advisement, after which they were placed upon its docket for public discussion and consideration. Hearings were held daily for over four weeks, at which hundreds of shippers were present and stated their views before the committee. The Uniform committee sat with the Western committee throughout these hearings. Every shipper who appeared was afforded opportunity to be heard, and in each instance where it was found that the findings of the Uniform committee should be modified the necessary modification was made, with the approval of the Uniform committee. The purpose of the carriers in placing the findings of the Uniform committee before the shippers for their consideration and recommendation was to arrive at a fair and just conclusion in every instance. So thorough were the efforts of the Uniform committee in arriving at their findings, and so carefully did the Western committee in conjunction with the Uniform committee heed every reasonable request for a modification of the Uniform committee's findings, that we can truthfully say that the findings of the Uniform committee, as finally adopted by the Western committee, meet with the approval of the large majority of interested shippers. The findings of the Uniform committee, in the form adopted by the Western committee, appear in Western Classification No. 51.

"Following the promulgation of Classification No. 51, several protests against its adoption were filed by certain agricultural implement shippers, acid manufacturers, by a shipper of excelsior, by the wholesale grocery interests of Chicago on account of the canned goods mixture, by several machinery firms against 'Note 3' on machinery, by the paper dealers on writing paper descriptions, and some few others, but the most vigorous protest of all was filed by representatives of certain state railway commissions, who objected to every change that had been made in the rules, carload minimum weights and ratings, that it was felt might effect an advance in transportation cost. The representatives

referred to requested that the effective date of the entire classification be postponed, in order to give the objectors an opportunity to check the items and obtain evidence upon which to attack each change under which there was an increase in rate or with respect to which it was felt that the transportation cost might be increased. The classification was suspended and hearings have been held at which a great deal of testimony was taken.

"Aside from the adoption in Classification No. 51 of the findings of the Uniform committee, various changes were made in the ratings which involved both advances and reductions. When considering the findings of the Uniform committee it was found by the Western Committee that a great many of the ratings provided in Classification No. 50 were not on a proper basis. Examination of the items developed that the ratings had been established on low priced articles or material, which when the ratings were made, had been submitted by shippers without any investigation upon the part of the carriers to ascertain whether they were truly representative of their kind with respect to the elements of value, density, etc. It was found in many instances that much more expensive grades are on the market than the grades on which the ratings provided had been predicated, and that when the average values, density, etc., are taken into consideration higher ratings than those provided in Classification No. 50 are justified.

"In other cases it was found that the ratings had been established in connection with a carload minimum weight which the shippers represented could be loaded, and that in numerous cases of this kind the minimum weight could not be loaded. In all such cases the carload minimum weights were reduced to a reasonable loading basis for a standard 36-ft. car, and ratings were established, which in some cases involved an advance to a reasonable basis for the minimum weights prescribed. Where the contrary was found to be true, the carriers did not hesitate to concede reductions in the ratings, and acting accordingly hundreds of reductions have been made in the ratings under those provided in Classification No. 50.

"It was stated by one of the state railway commissioners that the reductions in ratings related principally to commodities that do not move, or at least that move in limited volume. This we emphatically deny, and by way of answer refer to the large number of protests that have been made against the suspension of the ratings that have been reduced. It was stated, also, that the promulgation of Classification No. 51 represents an effort through the medium of the classification to secure a general advance in rates throughout the West. But an impartial analysis of the changes in ratings that have been made will disprove any such intention on the part of the carriers.

"Numerous objections to Classification No. 51 were offered by representatives of certain state railway commissions, based on the allegation that advances had been effected through changes in package requirements and by the elimination of carload ratings. The Uniform committee when dealing with specific items, found package specifications for certain items which provided for some packages that are not used, and in other cases for packages that are unsafe for transportation. Provisions of this kind were eliminated with the approval of shippers. Such eliminations of carload ratings as have been made were based entirely on investigation by the Uniform committee, which developed that in those cases there is no carload movement, and therefore no necessity for carload rating. In all the cases where carload ratings have been eliminated, only two instances have developed where a carload movement has been demonstrated, and in those two cases the carriers have agreed to restore the carload ratings. Further, the carriers are willing to restore any of the specific carload ratings that have been eliminated, if the interested shippers are able to demonstrate that they shipped in carloads under Classification No. 50.

"In the preceding pages we have described the character of the work of the Uniform Classification Committee, and the object which that work was and is intended to accomplish. The committee in its work was at times confronted with transportation and commercial conditions that were peculiar and restricted to a given territory, but as uniformity in classification for the entire country was the end that the committee had in view, it was found that only the general average of conditions throughout the whole country could be accepted, and that conditions peculiar to a restricted territory necessarily had to be ignored. In no other way was it possible for the committee to prosecute its work along uniform lines, and in no other way can uniformity in classification ever be secured. Therefore, the findings of the Uniform committee are necessarily based on average conditions, and cannot be expected, in the very nature of things, to reflect a variety of local circumstances and conditions. This feature of the committee's work is well known to, and understood by, the great majority of interested shippers, and with a few exceptions, they have approved the committee's findings. The record in this investigation is replete with testimony that reflects conditions which are peculiar to given localities, or which are based wholly on some commercial condition. Manifestly, the classification is not a proper place in which to recognize conditions of this character.

"As already pointed out, every reasonable effort was made by the carriers to secure approval of the changes by shippers, and we felt that little opposition would develop to those changes. However, a few representatives of some of the state railway commissions, who interested themselves in securing the suspension of the classification, and who were most active throughout the hearings in opposing each advance, conducted a series of correspondence with many shippers in an effort to induce them to appear at the hearings and testify, or at least furnish information or data that could be used in opposition to these changes. In fact, the efforts thus made were not confined to changes, but in a number of instances related to items on which no change had been made. We even have letters in our files which leave no room for doubt that, when in certain instances these representatives, or those working in harmony with them, were advised that the shipper had no complaint to offer, a second letter was sent out containing the statement that it was a well known and generally understood fact that the carriers proposed to cancel the commodity rates of that particular shipper and thereby increase his cost of transportation, the statement apparently having origin in the imagination of the writer. We do not question the right of any one to file complaint with the commission on any matter within its jurisdiction, or to communicate with shippers in an effort to secure evidence, provided the effort is *bona fide* and the attitude of the carriers is correctly represented. But looking at this matter in an open and fair manner, we do question the expediency of the untiring efforts of those representatives, who are not themselves shippers or personally concerned in these changes as such, to induce complaints against various items, when as a matter of fact the great majority of those items already had been so formulated as to meet the views of the interested shippers. From the foregoing we do not think it can be questioned that much of the testimony, other than that relating to agricultural implements and the proposed adoption of a rule similar to Rule 10 of the Official Classification, was inspired in this manner."

Construction Work in Ecuador.—The grading of the Manta Railway is within a few miles of Portoviejo, and construction trains are running to within three miles of Montecristi. The most difficult piece of work and the largest cut on the line is at the pass of Cerro de Hojas.

Cuban Railway Bids.—A presidential decree of July 25, 1912, suspended the opening of the Cuba bids for building the Caibarien and Nuevitas railway until September 30, 1912. The construction of this railway carries with it a subsidy of $2,000,000 by the Cuban congress, payable to the company constructing the line, provided the railway passes to the south of the Bamburano hills.

NEW BOX, STOCK AND REFRIGERATOR CARS.

Steel Frame Freight Equipment with Steel Roofs, the Framing Being Suitable for Three Types of Cars.

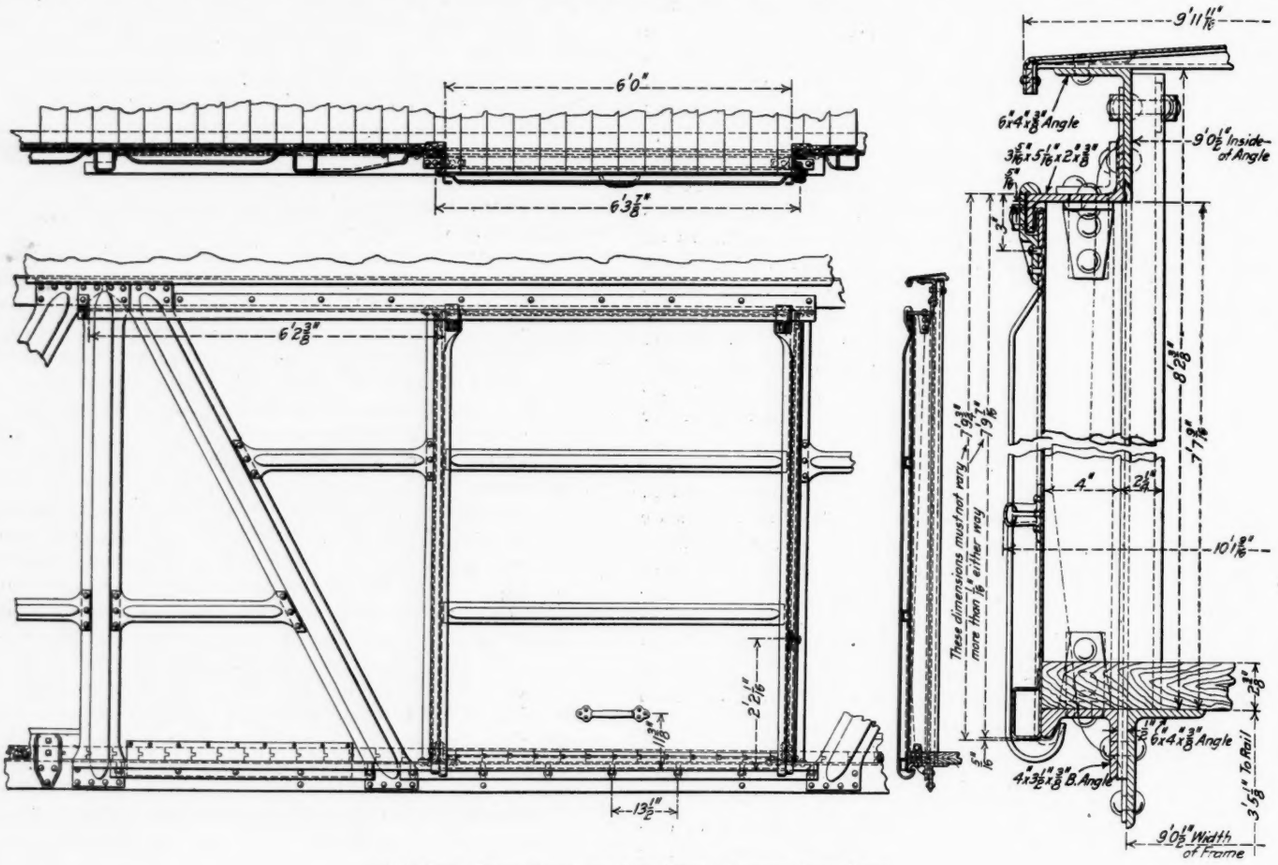
In harmony with the decision to eventually have all of its cars of the all-steel type, a freight car, the framing of which can be used practically without change for either box, stock or refrigerator cars, has been designed in the mechanical engineer's office of the Pennsylvania Railroad. The all-steel design is not feasible for the two latter types of cars, and in considering the box car design, the advisability of the use of steel was taken up with the transportation, traffic, claim and other departments of the railway, as well as with a number of shippers. The decision arrived at from this discussion favored the use of a wooden floor and a wooden lining, and the new box cars are being built in this manner. If at any time it seems desirable to use a steel inside finish, it can be substituted without material change in the structure.

The box car thus consists of a steel underframe of the fish-belly center sill type, but differing from previous designs as will be explained later; steel side framing formed of posts and braces in pressed shapes secured to angles at the top and bottom; an all-steel roof made up of steel carlines and steel roof sheets, the latter having riveted butt joints with an outside and inside cover plate; a 2⅜ in. tongue and grooved wooden floor and a 1¼ in. tongue and grooved side and end lining on the inside of the posts and with the joints running vertically. The stock and refrigerator cars differ from this only in the lining. The box cars have sliding all-steel doors of special design, while the stock and refrigerator cars have flush doors. All cars now being built are carried on standard arch bar trucks, having 5½ in. x 10 in. journals. The box and stock cars have an inside length of 40 ft. 6 in., a width of 8 ft. 10 in. and a clear height inside of 8 ft. The maximum width over the eaves is 9 ft. 11½ in., and the total length of car outside of end sills is 42 ft. 6 in. The top of the floor is 3 ft. 7½ in. above the top of the rail.

UNDERFRAME.

The underframe of these cars follows the same plan employed in the steel passenger cars on this road, wherein all of the weight of the car and lading is transferred to the center sills through the medium of two cantilevers, one at either end, located 7 ft. 4 in. inside the center plate, and the two end sills. Thus the body bolster, as it is customarily built, does not appear in this design and the framing at that point is only such as is needed for stiffness and to carry the side bearings. The center sills are formed of ⅜ in. plate pressed with 4 in. flanges at top and bottom. The sill is 20 in. deep between the cantilever connections and narrows to 11 in. at a point 22 11/16 in. inside the center plate and continues this section to the end sill. A 4 in. x 4 in. x 9/16 in. angle is riveted to the bottom of each sill on the inside, and extends continuously between the inside draft lug faces, which are incorporated in the center plate casting and are located about 15 in. outside the center pin at either end. A ⅜ in. x 24 in. top cover plate extends continuously for the full length of the center sills.

The cantilevers on either side of the center sill are formed of two dished sections of ⅜ in. plate, having 3½ in. flanges. These are set 5 in. apart and secured to the web of the center sill and to the 4 in. x 6 in. x ⅜ in. angle forming the bottom member of the side truss, hereafter called the side sill, by riveting through their flanges. There is a ⅜ in. x 12 in. top cover plate, 5 ft.



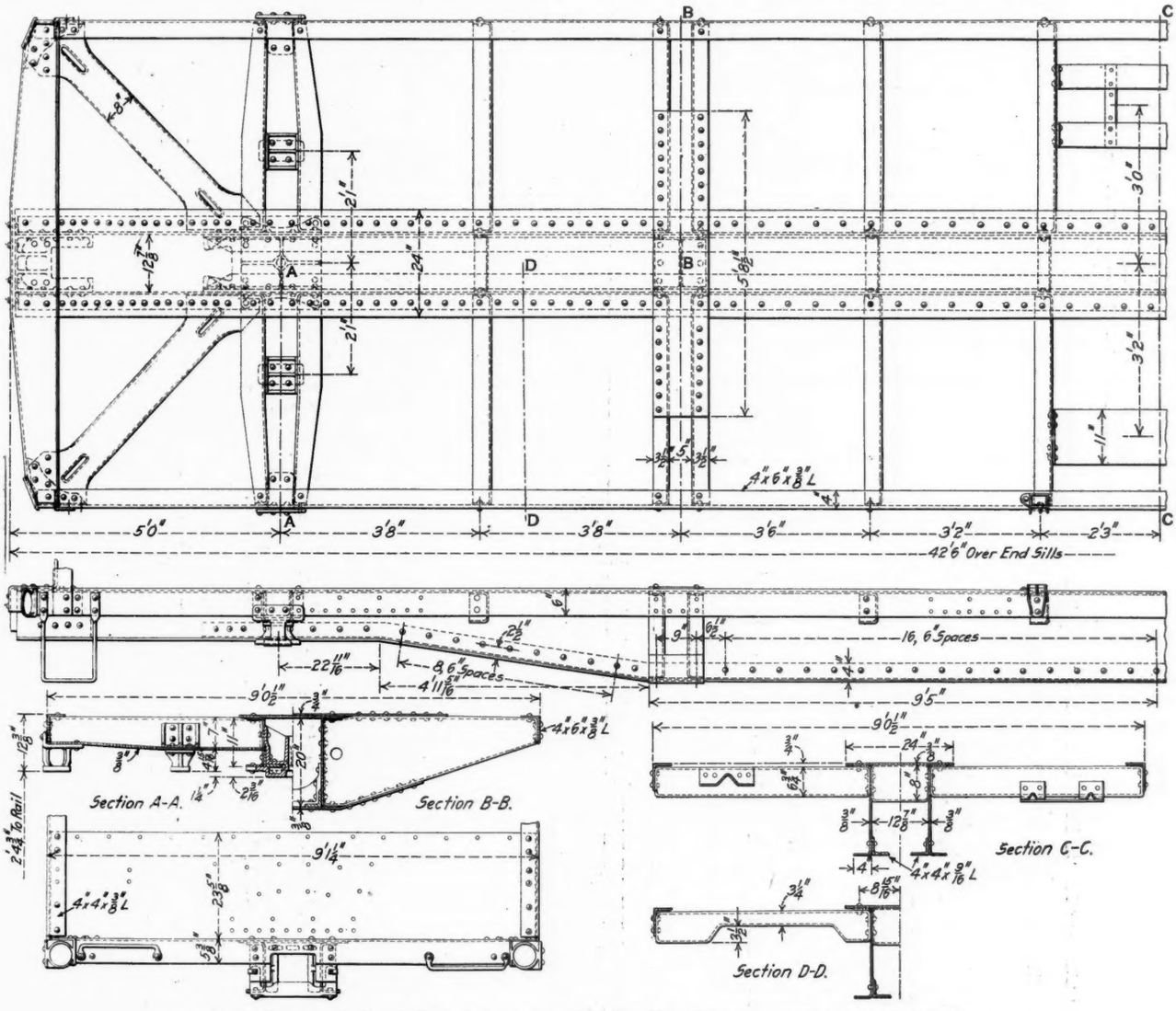
All-Steel Door Used on the Steel Frame Box Cars.

8½ in. in length and a similar ⅜ in. bottom cover plate which extend continuously across the top and bottom of the center sill and are riveted to the flanges of the cantilever members. A properly formed casting is used as a stiffener between the bottoms of the center sill girders at this point.

At the end sills a large part of the weight of the car structure is transferred by diagonal braces from the corners directly to the center sills; hence the structure of the underframe at this point is considerably lighter than at the cantilever, but is of even greater stiffness in the vertical plane. The end construction consists of a ⅜ in. plate extending the full width of the car. It has a depth of 5 in. below the top of the center sills and is flanged inward for a distance of 10⅜ in. at the center and narrows somewhat toward either side, and then is carried up on the inside of the corner and end posts for a distance of 23⅝ in. It is secured to the draft casting at the end, to a corner casting which includes the push pole pockets, to the side longitudinal angles, to the corner posts and the end post and braces, as well as to the two horizontal stiffeners between the corner post and the braces just at the top of this plate. A study of the drawings will show the advantages of this end construction, which not only has great stiffness in the vertical plane but also forms a secure and permanent end structure suitable for resisting shocks, both of shifting load and of misuse.

At the center plate the usual bolster is replaced by "U" shaped pressed steel sections 7 in. in depth, and 7⅜ in. wide in the channel section, which are riveted through their outward flanged edges to the center and side sills. Above the side bearing is an iron filling and stiffening piece. At the extreme end is a casting suitable for attaching chains, or for jacking the car. The center plate casting fits between the members of the center sill and extends some distance toward the end sill, forming the back stop casting for the draft gear. The center plate itself is a separate piece riveted to the bottom of the sill. Very heavy diagonal braces extend from the corner casting, which includes the push pole pocket, to the center sills at the center plate.

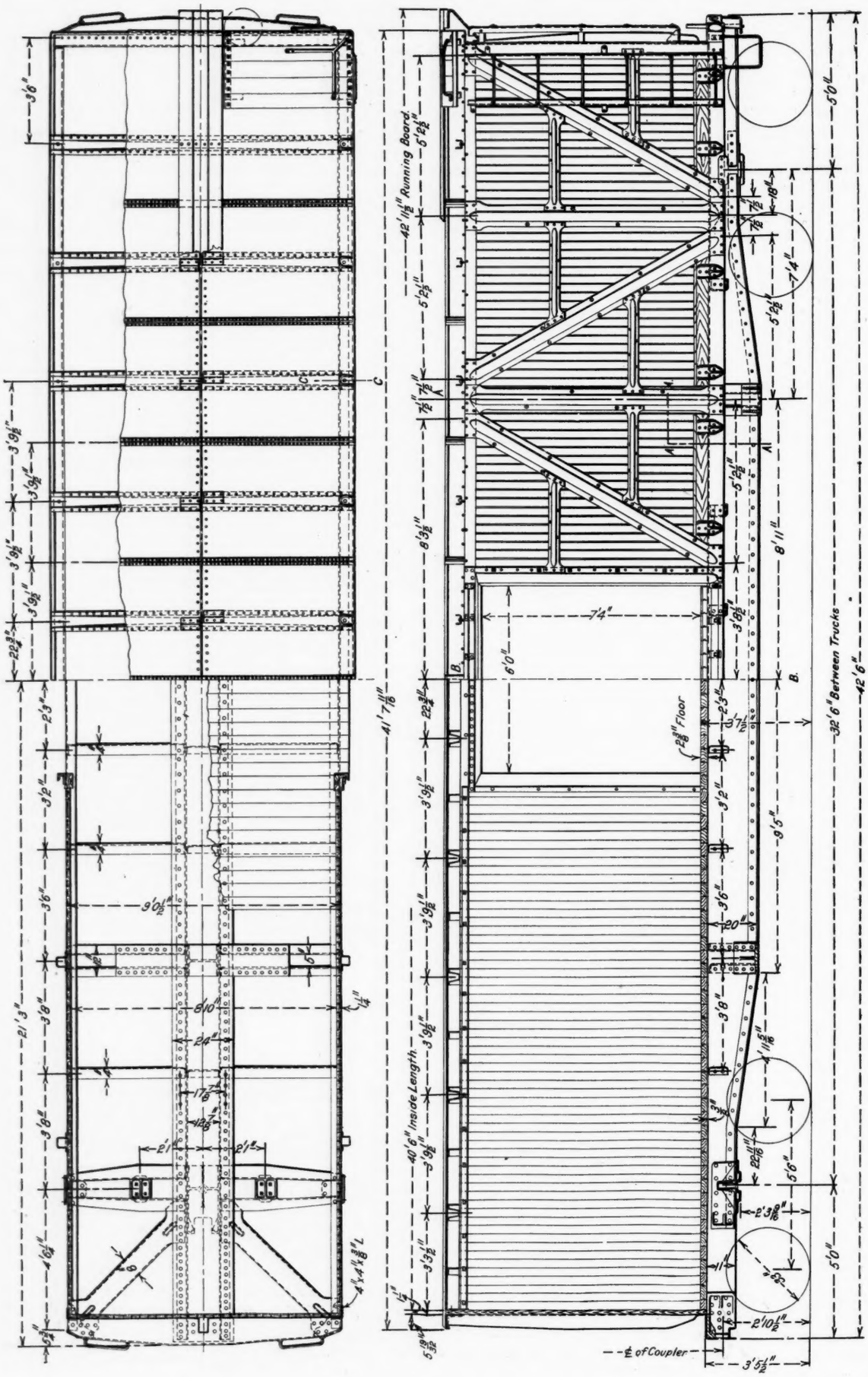
There are six stiffeners between the center and side sills, four being located between the cantilevers and one midway between them and the center plate. These consist simply of dished sections 6¾ in. in depth and without cover plates. Similar dished pieces 8 in. in depth are secured between the center sills at these points. There are no intermediate longitudinal members, the floor being constructed of 2⅜ in. material, giving ample strength to carry the lading without such supports.



Underframe of Steel Box, Stock and Refrigerator Cars; Pennsylvania Railroad.

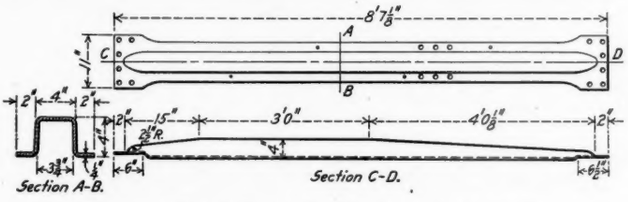
SUPERSTRUCTURE.

The side framing consists of a series of posts and braces, each formed of ⅜ in. open hearth steel pressed in "U" shape of varying cross section, as is shown in the detail of one of the posts. The shape of these members is such as to give the greatest



Forty-foot Box Car with Steel Frame and Steel Roof; Pennsylvania Railroad.

resistance to side thrust at a point about one-third of the distance above the floor. The side flanges are wide and the ends are flat, being riveted directly to the sill and plate. This type of post was selected on account of its great strength and light weight, and the opportunity given for a strong connection at the joint. Sufficient rivets can be inserted to develop the full strength of the member without the necessity of using angles or gusset plates. These posts and braces are secured at the top to a 4 in. x 6 in. x ⅜ in. angle which has its shorter leg extending outward. At the bottom, the angle forming the side sill has its shorter leg extending inward. The posts and braces are indented at the ends to fit around the angles, giving a smooth



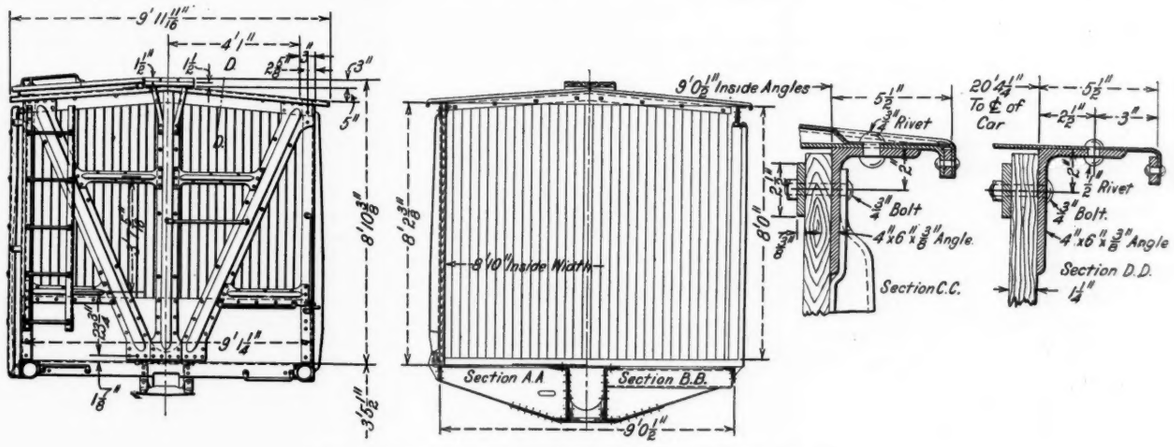
Pressed Steel Posts for Steel Freight Cars.

surface on the interior of the car for the attachment of the lining.

It will be noted that the main posts are located at the connection of the cantilever to the side sills and a large portion of the weight of the car body superstructure, as well as part of the lading, will be carried through these posts and the cantilevers to the center sills. The weight from either side is transferred to them at the top by the diagonal braces which are of the same general form and style. Another post is located between the main posts and the end of the car. It will be seen that this does not come opposite the center plate and none of the load is transferred to the underframe at this point. The weight of the roof carried by this member is transferred up through the diagonal braces and distributed equally to the main post and to the end framing. Both the upper and lower longitudinal members of the truss are continuous for the full length of the car body. The side sill is reinforced under the door by a 4 in. x 3½ in. x ⅜ in. bulb angle riveted to it. The Z bars installed for door slides also give some reinforcement at the top of the openings. The door posts themselves are bulb angles and are fastened to the plate and sill at either end.

The short horizontal struts of the same general style as the posts and braces, and secured between them at various points, are included as a means of fastening the side lining rather than part of the frame structure. The corner posts are 4 in. x 4 in. x ⅜ in. angles and have one leg cut away at the bottom where they are riveted to the side sills. Inasmuch as they pass outside of the end lining and are securely riveted to it, and are also fastened to the side sill, this does not offer a point of weakness. The end of the car has a post in the centre, and diagonal braces from the upper corners to the center sill on either side. These pass outside the steel end sheathing and are securely attached to it. They transfer practically all the weight of the car body and a portion of the lading directly to the end of the centre sills at this point. Practically all the rivets at the connections between the principal members in the side framing are ¾ in.

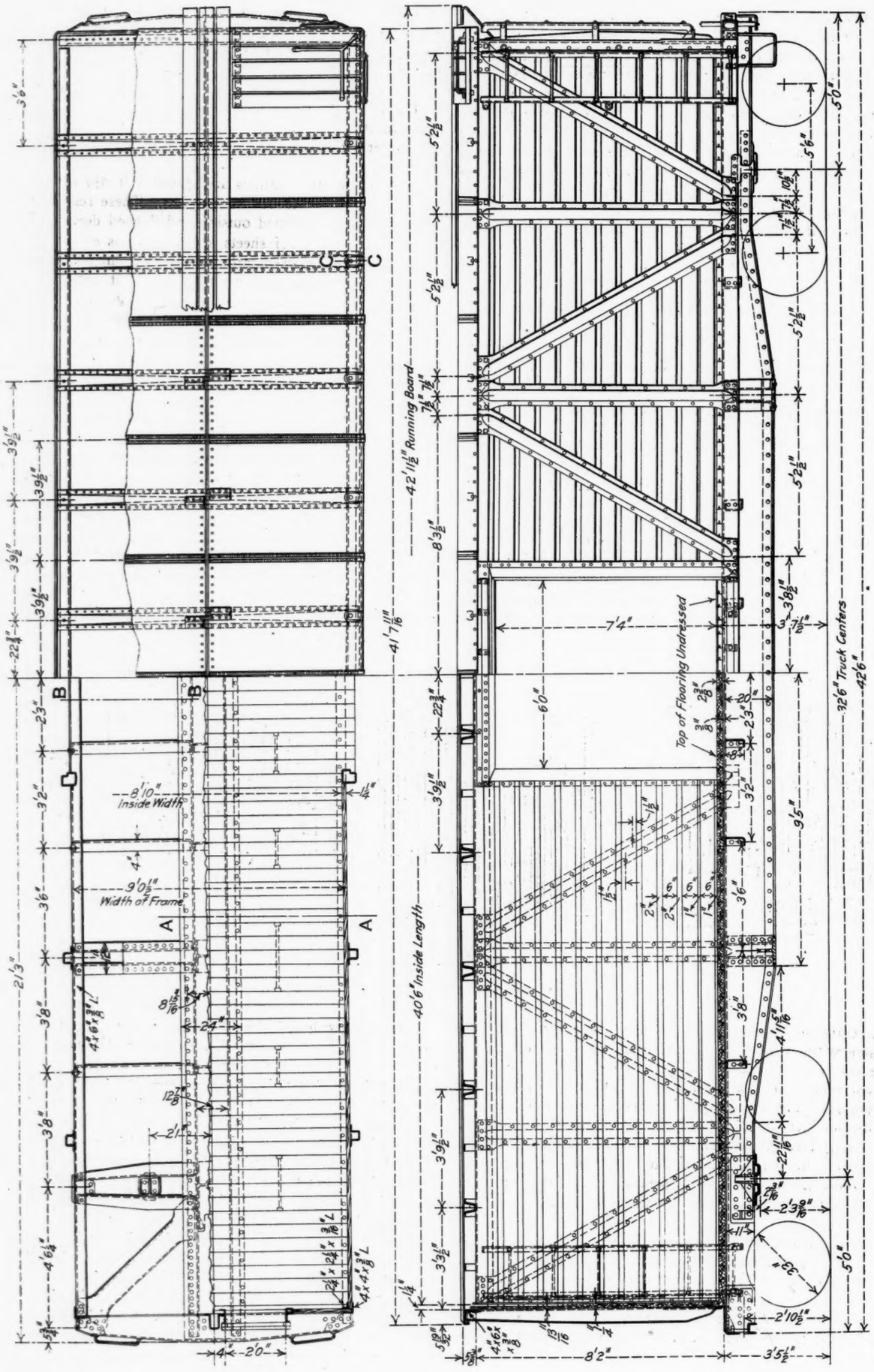
Specially designed steel carlines are spaced 3 ft. 9½ in. apart, being located without reference to the posts. These rest on top of the plate and are continued outside and flanged down at the ends. The ⅛ in. steel roof sheets are in sections of the same width as the distance between carlines, but the joint comes midway between the carlines. Above the butt joint between the sheets the upper cover plate is formed with a ridge in the centre which adds to the stiffness of the structure. One-quarter inch rivets are spaced close together at the joint and no calking is required. The roof sheets on the cars now under construction are not continuous across the car and the joint at the center is formed by flanging up the edges and riveting them together. At the eaves the roof sheets are carried out beyond the plate and flanged over and a ⅜ in. x 1 in. strip is riveted along the edge on the inside, forming a stiffening piece. The roof structure is secured to the car framing at the sides by only ten rivets on each side. These are at the carlines where the sheet is bumped down and a ¾ in. rivet passes through the sheet, carline and outwardly extending leg of the angle forming the plate. At the end of the car, the carline is formed of a 4 in. x 6 in. x ⅜ in. angle of the proper shape, and the roof sheets extend over it and are secured to it by a large number of ½ in. rivets. Here the eaves are carried over in the same manner as at the sides.



End Elevation and Sections of Steel Frame Box Car.

The running boards are fastened to two short sections of Z-bars, riveted directly to the carlines and through the roof sheets as is shown in the illustration.

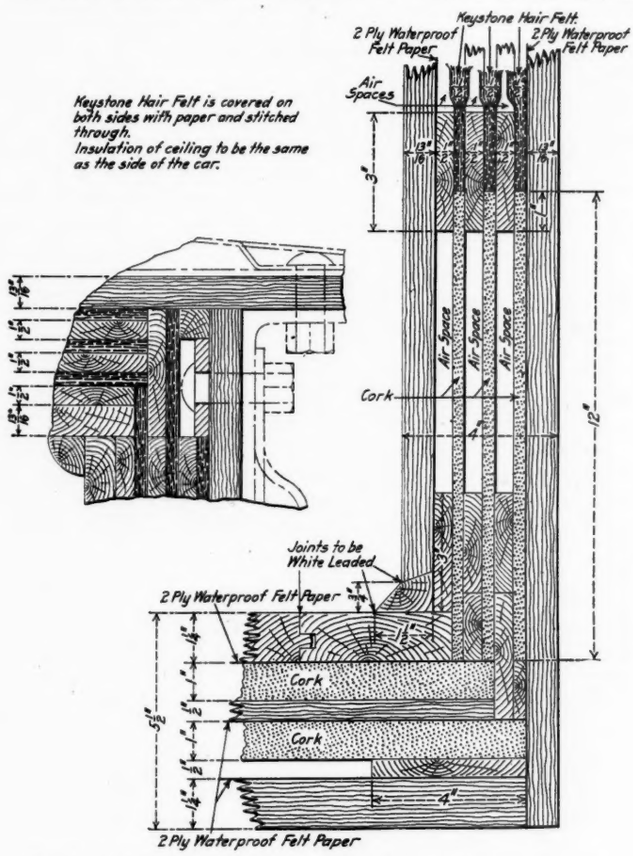
The wooden side lining is secured on the inside of the frame at the top by means of a ⅜ in. x 2½ in. bar on the inside of the lining, which is held by ¾ in. bolts passing through the plate and with nuts on the inside. It will be noted that the top of the lining is somewhat below the top of the plate and that between all carlines there is an open space between the plate and the roof sheet, equal to the thickness of the carlines at this point. This permits excellent ventilation of the car without the possibility of the entrance of snow or rain. At the bottom the side lining extends inside of the floor down to the side sill, and is held on the outside by a wooden strip fitted between the posts and braces, which is held by castings riveted to the side sills. In addition, the lining is secured to the posts and braces by numerous screws. At the end of the car the lining only extends down to the top of the steel plate.



Stock Car Which Practically Differs from the Box Car Only in the Lining and the Type of Door.

DOORS.

An all-steel door of exceptionally light and simple design has been applied on the box cars. It consists of a sheet of ⅛ in. steel of the proper size flanged over in box section at the bottom and in "U" section at the top. An upward extending flange at the box section is spot welded to the main sheet. There are two horizontal pressed steel members of "U" section equally spaced


Keystone Hair Felt
2 Ply Waterproof Felt Paper
2 Ply Waterproof Felt Paper
Air Spaces
Keystone Hair Felt is covered on both sides with paper and stitched through.
Insulation of ceiling to be the same as the side of the car.
Air Space
Air Space
Air Space
Cork
Joints to be White Leaded
2 Ply Waterproof Felt Paper
Cork
Cork
2 Ply Waterproof Felt Paper

Section of Refrigerator Car Insulation at Lower Corners.

on the outside of the sheet and spot welded in place. At either side are Z-bars, spot welded in place. These are formed over in hook shape at the bottom and pass under and back of the edge of the bulb angle secured below the floor opening. This angle is continued to the first post. At the top the Z-bars are flattened out and secured in the flange at the upper part of the sheet. At this point are also riveted the carrying irons which are not provided with rollers but slide with metallic contact on the abbreviated Z-bar at the top of the door opening, which also extends to the first post.

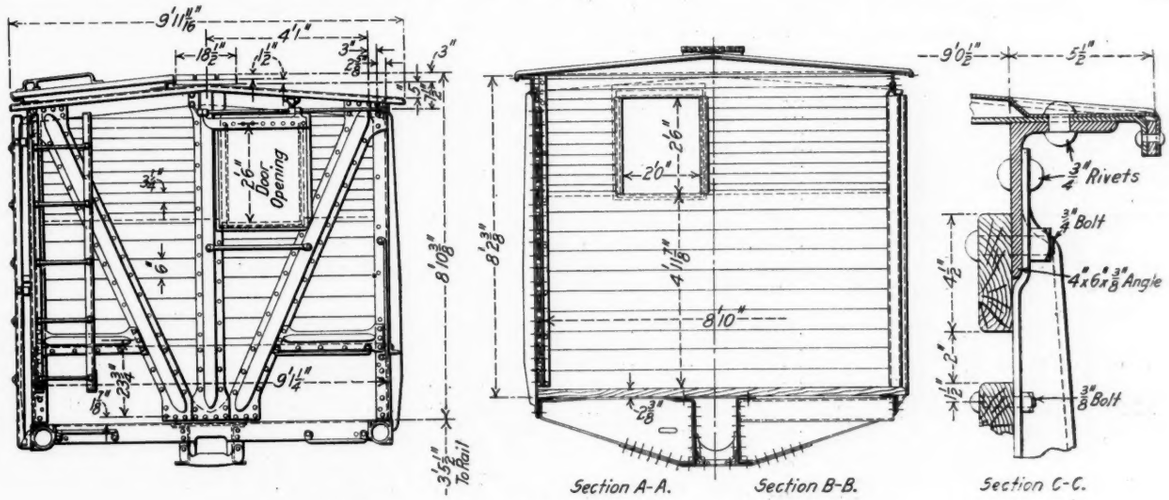
The door is thus secured at each corner, both top and bottom, no matter what its position may be. It is entirely smooth on the inner surface and is set out sufficient to clear the side posts and braces. The floor is carried out to meet the door in the opening, the extension being supported by the bulb angle. The sides of the opening are filled by bulb angles of the proper width which are secured to the top and bottom members of the door frame by corner irons, and are also riveted to the sill and side plate. These members form the door posts and are backed up by 2 in. hard wood strips. The Z-bars at either side of the door are flanged from steel plates, and the one at the back of the door is carried around the edge of the sheet to form a lip and seal the opening. The door stop is another Z-bar flanged from plate and secured on the outside of the door post. It extends out a sufficient distance to form a stop for the full height of the door. The handle is riveted directly to the sheet and does not increase the side clearance of the car.

STOCK CAR

The adaptation of this framing to a stock car is shown in one of the illustrations. The only changes are in the method of securing the lining or slats and the arrangement of the door. The underframe, side framing and roof structure are practically identical with the box car. Since the slats run horizontally there is no necessity for the horizontal struts between the posts and braces. The hard wood strips forming the slats are 1¼ in. x 6 in. and are secured directly to the framing by ⅜ in. bolts with the nuts on the outside. An end door is desired in this car, and it will be seen that there was sufficient room between the end post and the diagonal brace in the upper part of the car. This door is arranged to slide toward the side of the car. There is a small 2¼ in. x 2¼ in. x 3/16 in. angle on the inside of the corners to hold the end of the wooden slats. The doors on this car are of the flush sliding type that has been standard for this type of equipment on the Pennsylvania.

REFRIGERATOR CARS.

The framing of the refrigerator car does not differ from the box or stock car except at the door posts, where on account of the smaller door opening, the regular pressed steel post has been included and the doors are carried on separate wooden posts bolted to the sills at the top and bottom and forming part of the lining. The type of insulation and the method of applying it is shown in one of the illustrations. It will be noted that the cork sheets are carried for nearly one foot above the floor level on the sides and ends, thus preventing the capillary attraction of the hair felt from carrying up any moisture that might pos-



End Elevation and Sections of Steel Frame Stock Car.

sibly leak through at the floor level. The insulation at the floor is of cork and is laid in two 1 in. layers with a ½ in. between; there are also three layers of two-ply felt waterproof paper.

The door is of the type customarily used on refrigerator cars, and the Miner door operating fixtures have been applied. The joints around the door are sealed by heavy canvas and hair arranged as a cushion.

The car has an inside clear length between ice tanks of 32 ft. 11½ in., a width of 8 ft. 4½ in. and a clear height of 7 ft. 4 13/16 in.

None of these cars have been completed, and it is impossible to obtain the actual weights; it is estimated that in each case the cars will weigh considerable less than the steel underframe and wooden superstructure car of the same size.

LEGISLATION CONCERNING STEEL PASSENGER EQUIPMENT.*

Six bills are pending in Congress requiring existing wooden passenger equipment to be replaced by steel. The periods suggested during which this is to be done vary from June 1, 1915, to January 1, 1918. In order to ascertain the progress of the building of steel and steel underframe passenger equipment and to develop the cost of the construction in steel of the present wooden passenger equipment in the country, circular No. 28 was issued to the railways on January 15, 1912, by the Special Committee on Relations of Railway Operation to Legislation.

Replies to that circular have been received by the committee from 225 companies, operating 219,089 miles in the United States, and 55,872 passenger equipment vehicles, with 1,211 under construction on January 1, 1912; and from seven companies, operating 20,815 miles in Canada, and 3,892 passenger equipment vehicles, with 312 under construction on the same date. Tabulations based on these replies are shown in the accompanying table.

The estimates and percentages given apply only to the equipment operated by roads in the United States.

*Taken from Bulletin No. 40 of the Special Committee on Relations of Railway Operation to Legislation.

Passenger Cars Acquired.

	Total Number.	Steel.	Steel Underframe.	Wood.
1909	1,880	26.0 per cent.	22.6 per cent.	51.4 per cent.
1910	3,638	55.4 per cent.	14.8 per cent.	29.8 per cent.
1911	3,756	59.0 per cent.	20.3 per cent.	20.7 per cent.
January, 1912 (under construction)	1,211	76.8 per cent.	16.2 per cent.	7.0 per cent.

Cars Approximately in Service.

	Steel.	Steel Underframe.
January 1, 1909	629	673
January 1, 1910	1,117	1,098
January 1, 1911	3,133	1,636
January 1, 1912	5,347	2,399
Increase 1912 over 1909	4,718	1,726
Increase 1912 over 1909	750 per cent.	256 per cent.

Approximate Cost of Replacement.

	Number.	Average Cost.	Amount.
Postal	832	$11,000	$9,152,000
Mail and baggage	2,855	10,000	28,550,000
Mail, baggage and passenger	669	10,000	6,669,000
Baggage and passenger	3,806	10,000	38,060,000
Baggage or express	7,428	8,500	63,138,000
Passenger	24,220	12,800	310,016,000
Parlor, sleeping, dining	7,343	22,000	161,546,000
Business	769	15,000	11,535,000
Motor	204	20,000	4,080,000
Total	48,126		$632,746,000
Annual interest charge at 5 per cent			$31,637,300

The charge to operating expenses under the classification of accounts of the Interstate Commerce Commission, assuming a value of $4,000 per vehicle replaced, will be $192,504,000.

New Lines for Ecuador.—Preliminary survey work has been commenced on the railways from Huigra to Cuenca, and from Puerto Bolivar to the Maranon river. These proposed railways will traverse some of the richest and most undeveloped sections of the republic, and will open up a great agricultural, mining and timber country.

STATUS OF PASSENGER EQUIPMENT ON 225 RAILWAYS IN UNITED STATES AND 7 RAILWAYS IN CANADA.

Number of Passenger Equipment Cars Operated	In Service December 31, 1911					Under Construction or Contracted for but not yet Received on Dec. 31, 1911				Acquired in Calendar Year 1911				Acquired in Calendar Year 1910				Acquired in Calendar Year 1909			
	Number Roads	Steel	Steel Underframe	Wood		Steel	Steel Underframe	Wood		Steel	Steel Underframe	Wood		Steel	Steel Underframe	Wood		Steel	Steel Underframe	Wood	
501 and upward	31	4,619	1,704	35,900		850	152	78		1,896	536	646		1,662	383	819		405	303	734	
201 to 500	21	498	323	5,854		28	14			235	113	43		174	102	118		15	35	119	
101 to 200	17	58	156	2,139		22	11			43	63	23		78	2	46		59	62	34	
51 to 100	25	118	55	2,090		22	17			28	32	9		80	32	44			7	7	
1 to 50	131	54	161	2,143		9	2	6		12	19	58		22	19	57		9	18	73	
Total U. S.	225	5,347	2,399	48,126	55,872	931	196	84	1,211	2,214	763	779	3,756	2,016	538	1,084	3,638	488	425	967	1,880
Sections:																					
New England	7	15	53	5,556		6	13	43			14	422			24	193		10	6	114	
East	72	2,202	680	16,828		511	107	1		889	204	99		583	82	230		167	58	182	
Southeast	53	47	454	4,933		23	42	4		37	219	68		6	27	102			157	77	
Northwest	22	427	61	3,392		32		35		202	20	99		120	1	352		64	62	151	
Southwest	34	229	217	3,138		91	32			78	28	61		90	41	89		24	30	68	
West	36	1,383	934	9,352		121	2	1		489	278	30		698	363	64		217	112	107	
Sleeping Car Co's	1	1,044		4,927		147				519				519		54		6		268	
Total U. S.	225	5,347	2,399	48,126	55,872	931	196	84	1,211	2,214	763	779	3,756	2,016	538	1,084	3,638	488	425	967	1,880
Canada	7			3,892	3,892		6	306	312			231	231			178	178			121	121
Total U. S. and Canada	232	5,347	2,399	52,018	59,764	931	202	390	1,523	2,214	763	1,010	3,987	2,016	538	1,262	3,816	488	425	1,088	2,001
Classes of Equipment:																					
Postal		528	203	832		48	4			286	88	11		140	10	11		52	30	5	
Mail and Baggage		164	113	2,855		71	23	1		95	47	36		43	34	70		17	17	65	
Mail, Baggage and Passenger		14	25	669		13				3	12	4		6	7	7			4	17	
Baggage and Passenger		174	89	3,806		50	35	10		45	29	42		110	16	64		12	22	62	
Baggage or Express		668	766	7,428		61	45	50		233	290	173		324	99	89		86	171	162	
Passenger		2,291	1,030	24,220		446	88	23		887	244	413		726	333	505		260	158	281	
Parlor, Sleeping, Dining		1,320	95	7,343		213				640	36	94		648	37	316		33	22	365	
Business		6	38	769			1			3	15	4		1	2	15		1	1	9	
Motor		182	40	204		29				22	2	2		18		7		27		1	
Total U. S.		5,347	2,399	48,126	55,872	931	196	84	1,211	2,214	763	779	3,756	2,016	538	1,084	3,638	488	425	967	1,880

ACCIDENT REGULATION BY THE GOVERNMENT.*

A Review of What the Interstate Commerce Commission Has Done Toward Reducing Deaths and Injuries on Railways.

BY C. C. M'CHORD,
Member of the Interstate Commerce Commission.

Railway accidents, their causes, and the means for their prevention is a subject which has caused general discussion in this country for many years past; and not without reason. When we learn that during the twenty-four years covered by the statistics of the Interstate Commerce Commission 188,037 persons have been killed and 1,395,618 persons injured on the railways of the United States, we are appalled at the magnitude of the slaughter. This is an average of 7,835 persons killed and 58,150 injured each year, or an annual total of nearly 66,000 persons killed and injured. This means that for every day during the past twenty-four years 181 persons have been killed or injured—nearly eight every hour, or one every seven minutes, with the regularity of clockwork. The ravages of war pale into insignificance before these silent indications of the destruction of human life accompanying the peaceful operation of our railways.

It is pertinent to inquire how much of this fearful record of slaughter is due to the unavoidable risk of the industry, and how much to causes that can be eliminated, as means for the prevention of accidents must obviously be directed to the latter causes.

TRESPASSERS.

Upon analysis of the above totals one cannot fail to be impressed by the surprisingly large number of trespassers they include. No figures pertaining to trespassers appear in the commission's statistics previous to 1890, and as no returns of accidents to "other persons" were received by the commission for the year 1910, owing to a change in the law requiring reports of accidents, we have a complete record of accidents to trespassers for only the twenty-year period, 1890 to 1909, inclusive. This record is sufficiently startling. There were 163,171 persons killed and 1,190,125 injured during this twenty-year period. Of the number killed, 101,629, or more than 62 per cent. of the total, are classified as "other persons," that is, they were neither passengers nor employees, and of these 101,629 "other persons," 86,733, or more than 85 per cent., were killed while trespassing. The trespassers killed during this twenty-year period were more than 53 per cent. of the whole number of persons killed on railways.

Of the 1,190,125 persons injured during this period, 142,040 or more than 11 per cent., were "other persons," and of this number 94,646, or more than 66 per cent., were trespassers. The trespassers injured constitute less than 8 per cent. of the whole number of persons injured.

The following is a tabular presentation of these facts:

PERSONS KILLED AND INJURED IN RAILWAY ACCIDENTS DURING THE TWENTY-YEAR PERIOD 1890 TO 1909, INCLUSIVE.

	Number Killed.	Number Injured.
All classes	163,171	1,190,125
Other persons	101,629	142,040
Trespassers	86,733	94,646
	Per Cent.	Per Cent.
Other persons to all classes	62.2	11.9
Trespassers to other persons	85.3	66.7
Trespassers to all classes	53.09	7.9

In the five-year period from 1905 to 1909 inclusive, 31,091 other persons were killed; 26,291 of these were trespassers. In the same period 49,786 other persons were injured, of which number 28,205 were trespassers. A significant feature connected with these figures is the surprisingly large number of trespassers killed by being struck by trains, locomotives or cars at "other points along the track." Of the 26,291 deaths to trespassers during this five-year period, 17,469 were due to this cause. The extremely fatal nature of this class of accidents is indicated by the fact that while more than 17,000 persons were killed, less than 10,000 were injured, the deaths exceeding the injuries in a ratio of 1.76 to 1. It may also be noted that while more than 53 per cent. of all the persons killed during the twenty-year period, from 1890 to 1909, were trespassers, less than 8 per cent. of the total persons injured were trespassers.

GRADE CROSSINGS.

Public attention for many years has been centered upon the question of abolishing grade crossings. While it is of course desirable that all possible precaution should be taken for the prevention of accidents at highway crossings, it is nevertheless true that the highway crossing casualties are extremely few as compared with those occurring at other points along the track. In the five-year period above shown, 4,261 persons were killed at highway crossings, as compared with 17,861 persons killed at other points along the track; 8,830 persons were injured at highway crossings, as compared with 10,686 injured at other points along the track. The casualties to non-trespassers at other points along the track are so comparatively few in number that they may safely be left out of consideration. It is probable that practically all of them occur to persons engaged in loading or unloading cars in railway yards, and it is doubtful whether persons engaged in such work can be surrounded with additional safeguards. When it is considered, however, that more than half of the fatal accidents on railways in this country occur to persons who have no right upon railway premises, it becomes apparent that there is a fertile field for reform in the method of dealing with trespassers. In England and on the continent of Europe walking on railway tracks is forbidden by law, and it should be here; furthermore, vigorous measures should be undertaken to make people understand that railway tracks cannot be used as footwalks with impunity.

Coming now to accidents to employees and passengers, we enter a field in which the federal government has displayed considerable activity, the result of which can be measured with a fair degree of accuracy. There are certain accidents which occur with more or less regularity and frequency on railways that may properly be called unavoidable. Such are accidents due to exceptional elemental disturbances, entirely unexpected landslides or washouts, want of ordinary precaution on the part of passengers or employees, malicious tampering with roadway or equipment, etc. Such accidents are accepted as among the ordinary hazards of railroading and may be dismissed from our reckoning.

There are accidents, however, which are fairly preventable, and against the occurrence of which travelers and employees on railways have a right to demand protection. It is important, therefore, to determine the causes of these preventable accidents in order that proper measures for their prevention may be undertaken.

SAFETY APPLIANCE LAW.

The safety appliance act of 1893 was the first attempt of the federal government to deal with railway accidents. This law dealt with a class of accidents the cause of which was plainly apparent. The killing and maiming of employees through the use of link-and-pin couplers and drawbars of uneven height had been a crying evil for many years. Railway journals had advocated reforms; state railway commissions had discussed the

* Abstract of address at the Co-Operative Safety Congress of the Association of Iron and Steel Electrical Engineers, on October 1, at Milwaukee, Wis.

question, and in some states laws had been enacted requiring the use of automatic couplers. But these state laws had made the situation worse rather than better, as they led to the adoption of different types of couplers for the different states, thus destroying the uniformity that is essential to safety where cars are universally interchanged, as is the practice on the railways of this country.

What have been the results of this legislation? To secure its enforcement the commission in 1899 appointed an inspector to examine railway equipment. Aided by congressional appropriation, this practice has been extended until the inspection force now numbers 31 men.

The year 1904 is the first one for which we have a complete record of the results of inspection. In that year the number of cars found defective in every 1,000 cars inspected was 311.87. In 1911, however, only seven years later, the situation had so much improved that of every 1,000 cars inspected only 44.63 were found defective, a reduction of 267.24 in the number of defective cars per 1,000 inspected, or more than 85 per cent., in this comparatively short period.

This improvement in the condition of safety appliance equipment quite naturally brought about a corresponding decrease in the number of those accidents to employees which the use of the appliances was designed to prevent. In the year 1893, for instance, the number of employees killed in coupling accidents was 433, and the number injured was 11,277. The number per million equipment then was 333 employees killed and 8,675 injured in coupling accidents. The total equipment in the year 1893 was 1.3 millions, but .3 million of which was equipped with automatic couplers. In 1911, with 2.4 millions of equipment, all of which had automatic couplers, 209 employees were killed and 2,966 injured in coupling accidents, an average of but 87 killed and 1,236 injured per million equipment, thus showing a reduction from 11,710 to 3,175 in the total of deaths and injuries from this cause, or a decrease of nearly 73 per cent. The showing per million equipment, as might be expected, is even better, the deaths and injuries on this basis being reduced from a total of 9,008 in 1893 to 1,325 in 1911, or more than 85 per cent. This decrease in coupling accidents is even more favorable than at first appears, for it has taken place coincidently with an expansion of business which has resulted in the crowding of tracks and terminals, and the use of heavier equipment and longer trains, thus introducing additional elements of risk.

In the light of the record it may safely be asserted that, considering the accidents to employees which the coupler and air brake laws were designed to prevent, the greatest part of those which now occur are due to the ordinary hazards of the railroading industry. It is also proper to observe that the use of these appliances, in addition to so greatly reducing accidents to employees, has brought abundant returns to the railways in economies of operation.

COLLISIONS AND DERAILMENTS.

Leaving those accidents the causes of which are plain and against the occurrence of which the law seems to have provided efficient safeguards, we come to a class of train accidents upon which public attention has been centered for many years, but which continue to occur with distressing frequency in spite of all measures thus far taken to prevent them. Collisions and derailments were responsible for 4,163 deaths, 63,002 injuries, and a property loss of $50,025,303 during the five-year period, 1907 to 1911, inclusive. The number of collisions and derailments during this period, as reported by the Interstate Commerce Commission, was 61,806. No road can claim immunity from these accidents, as they occur on the best equipped and best managed roads quite as frequently as on roads less well managed or equipped. Moreover, there is a dreary monotony in the sameness of the reported causes of these accidents. Year after year derailments and collisions due to identical causes are reported.

For the purpose of obtaining reliable data regarding the causes of these accidents, Congress enacted a law in 1901 requiring interstate railways to make monthly reports under oath to the Interstate Commerce Commission of all collisions and derailments, giving the nature and cause of the accidents and the circumstances connected therewith. It was expected that through the reports required by this law the causes of the accidents reported upon would be revealed and proper remedies for their prevention clearly indicated. Under the law the commission has published a series of quarterly bulletins based upon the monthly reports received from the railways.

The publication of these bulletins quickly brought into prominence the weakness of the personal equation in railroading, showing that by far the greater number of these harrowing train accidents were due to human error. The bulletins show that errors in the operation of the train order system are frequent and fatal. Such errors are all of a kind. Despatchers give wrong orders, or fail to give orders where they are required; operators fail to copy orders correctly, or do not deliver orders that should be delivered; conductors and enginemen misread, misinterpret, overlook or forget orders.

This weakness of the train order system of operating trains, as disclosed by the commission's accident bulletins, gave impetus to agitation for the compulsory use of the block system. In its annual report for the year 1903 the commission recommended such legislation and submitted a draft of a tentative bill requiring the use of the block system on all interstate lines within a certain period. A bill following the suggestions of the commission was introduced in Congress in the winter of 1905, and has been reintroduced at every subsequent session, but has not yet been enacted into law. In the meantime, the block system has been considerably extended, the block signal mileage reported for the year 1911 being 76,409.7 miles, as against 48,743.2 miles in 1906.

However, notwithstanding the theoretical merits of the block system as a means of safety, it by no means insures immunity from collisions. Some of the worst collisions noted in the accident bulletins have occurred on block signaled roads. Obviously, the block system can only afford protection when its danger warnings are observed and obeyed. The intensity of attention and quickness of perception required of enginemen on our modern, high-speed trains lead to the result that they sometimes fail to observe or obey signal indications, and when this happens, disastrous consequences are almost sure to follow. In the operation of the manual block system also, block operators sometimes make mistakes which lead to fatal results.

AUTOMATIC STOPS.

Noting these disasters due to human error, under the most highly approved system of train operation, the question naturally suggested itself: "Is it not possible to employ mechanical means that will automatically assume control of a train and bring it to a stop whenever a danger signal is for any reason disregarded?" Automatic stops had been in successful operation for several years on underground and elevated lines, but their general use on roads in the open country was not considered practicable. To determine the general practicability of such devices, therefore, Congress, in 1906, directed the commission to conduct an investigation, accompanied by experimental tests, of appliances for the automatic control of trains. To comply with the direction of Congress, the commission appointed a board of experts which conducted an investigation extending over a period of nearly five years. Reports stating the results of the board's investigations were issued annually. The last of these reports, issued December 26, 1911, states that "the information obtained from tests, together with knowledge of the general state of development of the art of automatic train control, leads the board to conclude that there are several types of apparatus and methods of application which, if put into use by railways, would quickly develop to a degree of efficiency adequate to meet all reasonable

demands. Such devices properly installed and maintained would add materially to safety in the operation of trains. In many situations, under conditions existing in this country, the board is convinced that the use of automatic train stops is necessary to the safety of trains."

HOURS OF SERVICE.

Another matter made prominent by the accident bulletins was the long hours of service to which train employees were subjected. Accidents were reported in the bulletins where the employees involved had been on duty an excessive number of hours, and it seemed apparent that such accidents were largely contributed to, if not directly caused, by excessive periods of service.

Whether the enforcement of the hours of service law has resulted in any increase of safety in train operation it is impossible to say, as a statistical presentation of results cannot be made. That the law has been of great benefit to employees, however, is certain. There can be no doubt that the efficiency and morale of railway train service has improved. Furthermore, the economic result of the law's operation is believed to be of benefit to the railways. Trains are moved over the road in less time than formerly, and the number of train miles run for each trainman employed has considerably increased since the law became effective.

Experience with the accident report law soon developed the fact that its underlying purpose, which was to secure accurate information respecting the actual cause of train accidents, could not be accomplished by relying upon the reports made by railway managers. Railway officials often seemed to think it their duty to withhold essential facts on account of some real or fancied liability that might impair the company's rights or interests in future court proceedings. Some companies seemed to have adopted a settled policy of furnishing the least possible information on all matters connected with accidents on their lines. Moreover, it was found impracticable to formulate a code of questions that would elicit satisfactory answers by letter in cases where the cause of a collision or derailment was at all complicated or obscure, or where the responsibility was chargeable to two or more persons. In such cases cross-examination is necessary to get at the true facts.

INVESTIGATION OF ACCIDENTS BY THE COMMISSION.

It became apparent, therefore, that independent investigations, conducted under authority of the federal government, were necessary to develop the true facts, and after an agitation extending over a period of six years a law authorizing such investigations was placed on the federal statute books on May 6, 1910.

Investigations under this law began in June, 1911, and up to date 85 accidents have been investigated and reported upon by the various inspectors. The chief of the division of safety appliances has submitted his reports to the commission on 72 of these accidents, and 53 have been summarized in accident bulletins 41, 42 and 43. Detailed reports of the more important accidents investigated have been printed as separate documents by the commission.

The investigations have not yet proceeded far enough to indicate the need of any specific legislation other than that which has already been proposed, but they have confirmed the need of a law for the compulsory use of the block system, and for the use of automatic stops in certain situations, as also for a uniform code of signals and rules, a bill providing for which has already been introduced in Congress.

The inherent weakness of the train order system appears from the fact that of 47 collisions investigated, 23 were due to failure of conductors or enginemen to understand or obey orders; mistakes of despatchers or operators in issuing, transmitting, copying or delivering orders; forgetting or failing to keep clear of superior class trains; misreading watches, and improperly checking train register. These identical errors have been the cause of collisions with more or less frequency throughout all the years the train order system has been in operation. They occur under both the double and single order system, as well as with the intermediate order, and are inevitable wherever absolute reliance is placed upon the human element. It is universally admitted that the defects of the train order system cannot be cured by any improvement in the details of its operation. The only certain remedy is some form of block system that will insure the maintenance of an interval of space between moving trains.

But, as previously noted, collisions also occur under the block system. Such accidents in most cases are due to improper flagging or to failure of enginemen to observe or obey signals. Occasionally, where manually operated signals are in use, collisions are caused by mistakes on the part of signalmen. In short, collisions under the block system are due to the same fundamental cause as under the train order system, namely, human error. From the standpoint of safety, the block system is superior to the train order system only because it presents fewer opportunities for men to make mistakes.

NEED FOR BETTER RULES.

To prevent collisions, therefore, we must reduce the chance of human error to a minimum, and introduce measures to neutralize its effects when it does occur. This is a trite conclusion, but it is sometimes necessary to re-state a truism in order that the importance of a too familiar fact may be made prominent. To reduce the chance of human error in the operation of trains is a problem that has occupied the attention of railway managers for many years. Rules innumerable have been formulated with this end in view, and various disciplinary measures have been undertaken for the enforcement of such rules. But the results have not been entirely satisfactory. Why? Mainly because the rules, as well as the disciplinary measures for their enforcement, have too often been mere makeshifts. Rules have been violated with impunity, with the full knowledge of officials whose duty it was to enforce them, and disciplinary measures have been applied only in cases where disaster has followed disobedience. The crying need in railway service today is a sensible and entirely workable code of rules governing the operation of trains, a code that can be obeyed under all conditions of operation; a code the primary purpose of which shall be the prevention of accidents rather than the avoidance of legal responsibility for their occurrence.

Whenever it becomes the unwritten law on a railway that schedules must be maintained and trains moved over the road regardless of rules that have been enacted to secure safety, the conditions of disaster on that road are ever present and its managers are gambling with fate.

EXCESSIVE SPEED.

Excessive speed as a factor in train accidents deserves serious consideration. A number of derailments investigated were directly due to speed too high for the existing conditions of track or roadbed, and in several serious collisions high speed was an important factor. It is, of course, extremely difficult, if not impossible, to say absolutely what is a safe limit for the speed of trains. But the effort to maintain the schedules of these fast trains, and to bring them in on time, creates an undesirable mental condition and increases the chances of mistakes by employees.

This mental condition, this desire to bring the fast train in on time at all hazards, leads to the disobedience of many rules, and such disobedience is often winked at by the very officials whose duty it is to enforce the rules. Trainmen are thus encouraged to take dangerous chances, knowing that if they come through without accident their infraction of the rules will be ignored. It thus happens that most of the accidents to high-speed trains are directly caused by failure of some employee to perform his duty.

Failure of railway officials to determine with scientific accuracy the limits of safety, especially with respect to speed on

curves, no doubt has led to many derailments. There are no accurate engineering data showing the actual stresses which are set up in railway track structures by locomotives and cars of different weights and moving at different rates of speed. That an enormous strain is placed upon track by our heavy, modern trains, hauled by engines weighing upward of 200 tons, at 60 miles or more per hour, is beyond question. There is urgent need for accurate information on this point.

BROKEN RAILS.

Investigation of derailments due to broken rails has developed the fact that current specifications for the manufacture of rails are not adequate to guard against the most common type of fractures, and that the drop test does not reveal the presence of interior defects of a serious character. There is urgent need of reform in the requirements of the specifications, as well as in the methods of inspection at the mills, so as to insure that structurally sound rails will be obtained. This need is particularly urgent in view of the constantly increasing strains to which rails are subjected, due to increase in the weight and speed of trains.

THE STEEL CAR.

The superiority of the steel car, from the standpoint of safety, has been confirmed by the results of investigations, both with respect to collisions and derailments. Antiquated wooden cars have been totally destroyed, with serious results in loss of life and injury to persons, in accidents less severe than those involving steel cars, the occupants of which have escaped practically unscathed. The steel car is rapidly superseding the wooden car on practically all the prominent roads, and it may safely be predicted that unnecessary injury and loss of life in collisions and derailments, by reason of the use of antiquated and structurally unsound cars, will soon be a thing of the past.

We have now passed in review the various measures taken by the federal government for the prevention of railway accidents, with the results of their operation so far as known. No specific cure for these disasters can be offered, for none is at hand. Experience has shown, however, that the number and severity of railway accidents can be materially reduced by the introduction of methods and appliances which are entirely practicable, and it is particularly encouraging to note that there has recently occurred a general awakening among railway managers and railway trainmen's organizations which has led to a well organized movement on the more prominent railways of the country to secure greater safety.

In the working out of this problem of greater safety on railways we shall get no aid from a study of the railways of other countries. Our problem is essentially peculiar to this country, and must be solved in the light of conditions existing here. The most difficult and perplexing factor in this problem is the personal equation. The failure of the man at the critical moment is the thing to be guarded against, and this involves generally a reformation in methods of discipline and rules of operation.

The publication of reports of accidents investigated by the federal government acts as a powerful tonic on the whole situation, as shiftless methods which endanger life and property cannot long endure in the light of merciless publicity.

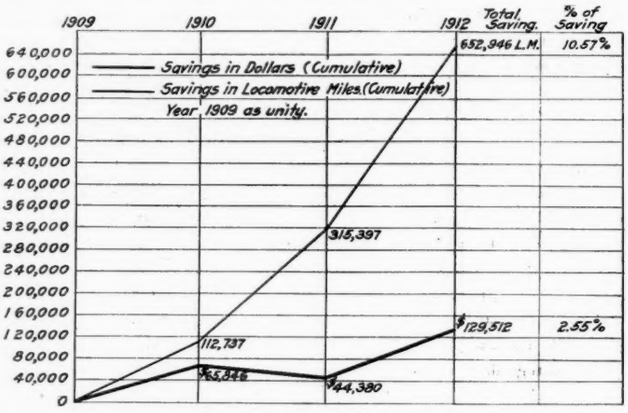
SAFETY COMMITTEES AN IMPORTANT FACTOR.

Great possibilities in the direction of a solution of the problem lie in the organization of so-called safety committees. These are now features in the administration of many prominent roads, and the slogan "safety first" has become a watchword in the details of their operation. In making safety the dominant idea in the minds of employees, by continually talking about it and pointing out methods for its attainment, an important step in the right direction is taken. It is necessary for the employee to think right before he can act right. These safety committees are also bound to be an important factor in reawakening in employees that old-time feeling of personal interest and pride in the record of "our road" that has been so largely dissipated by modern railway development. In short, co-operation for definite results all along the line is bound to result from the well directed efforts of these committees.

INFLUENCE OF GRADE REDUCTION ON COST OF OPERATION ON WHEELING & LAKE ERIE.

The annual report of Receiver B. A. Worthington of the Wheeling & Lake Erie (now president of the Chicago & Alton) for the fiscal year ending June 30, 1912, contains some interesting data on the results secured from the reduction of grades on the main line between Toledo and the Ohio river near Wheeling, and also on the line between Cleveland and Brewster, Ohio. The reduction of grades on these lines has been in progress for the last four years, and is now practically completed, with maximum grades of 0.4 per cent. westbound, and 0.5 per cent. eastbound.

From the report submitted, it is interesting to note that while the total tons of freight carried increased from 8,324,150 in 1908 to 11,410,313 in 1912, or 37.07 per cent., and while the freight ton miles increased from 977,265,071 in 1908, to 1,237,920,938 in 1912, or 26.67 per cent., the freight train miles only increased from 1,624,261 to 1,673,953 or 3.06 per cent. in the same period, while the



Saving in Miles and Dollars.

net tons per train mile increased from 602 to 740, or 22.92 per cent. This latter item shows a steady increase from 602 tons in 1908 to 620 in 1909, 640 in 1910, 680 in 1911, and 740 in 1912, indicating strongly the effect of the reduced grades on the train tonnage as the construction work was completed on different parts of the line.

Likewise, while the expenditures for maintenance of way and structures increased from $667,479.49 in 1908, to $871,514.80, or 30.5 per cent., and in maintenance of equipment from $1,148,755.29 to $1,402,075.60, or 22 per cent., the cost of transportation only increased from $2,249,368.10 to $2,485,883.66, or but 10.5 per cent., in spite of the increase of 26.67 per cent. in ton-miles hauled.

The accompanying table shows the savings in dollars and in locomotive miles resulting from the increased train loadings for the four years. The decrease in the savings shown in 1911 as compared with 1910 is due to the increase in wages which went into effect that year, and also to increased cost of fuel and supplies, as well as a slight decrease in traffic. The direct items of locomotive and train expenses include all expenses of train, yard and engine house services combined with cost of fuel, water, lubricants and other supplies used in the transportation department. The accompanying curves show graphically the accumulating increase in the savings due to lower ton mile cost of $129,512, and in locomotive miles of 652,946. The relatively greater percentage of saving in the locomotive miles of 10.57 per cent. as compared with the percentage of saving in dollars of 2.55 per cent., is accounted for by the various increases in wages and

fuel and supplies. The general advance in wages during 1910 amounted to over 6 per cent., while the cost of fuel advanced 10 per cent. From this it is apparent that the net saving of $129,512 is the net result after the absorption of a large portion of these increased expenditures. These improvements were made with the same locomotives which had been in service previous to the grade reduction, no new locomotives having been received since 1905, while a considerable portion of the engines in service have been in use over 20 years.

A Study Showing Economy Incident to Grade Revision.

	1909.	1910.	1911.	1912.
Revenue ton miles (in thousands)	889,916	1,100,045	1,059,785	1,175,463
Direct items of locomotive and train expense	$1,352,691	$1,606,202	$1,632,339	$1,701,571
Cost per ton mile (mills)	1.520	1.460	1.540	1.448
Freight locomotive miles	1,647,209	1,924,383	1,759,905	1,839,234
Average tons per locomotive mile	540	572	602	639
Saving due to lower ton mile cost	(Cumulative)	65,846	44,380	129,512
Saving in locomotive miles through heavier train loading	(Cumulative)	112,737	315,397	652,946

COMPARATIVE TESTS OF FREIGHT LOCOMOTIVES.

A saving of from 29 per cent. to 32 per cent. in coal and 27 per cent. in water per ton-mile in freight service has been effected on the Delaware, Lackawanna & Western by the introduction of a heavy and powerful class of Mikado type locomotives of the latest design in place of consolidation locomotives of a straight forward conventional design. This is shown by the results of comparative road tests between the new Mikados built for this company by the American Locomotive Company, and described in the September, 1912, issue of this journal, page 459, and consolidation locomotives previously used in the same service and purchased last year from the same builders.

TABLE NO. 1.

Summary of Average Results.

	Westbound. 2-8-0.	2-8-2.	Per cent. Difference.	Eastbound. 2-8-0.	2-8-2.	Per cent. Difference.	Average Per cent.
Distance	141	141	....	141	141	....	....
Ton-miles per trip	420,537	469,248	11.5	332,533	386,183	16.1	13.8
Scoops fired per trip	1,564	1,491	....	1,263	1,275	....	....
Coal fired per trip, tons	13.7	10.8	21	11.05	9.25	19.4	20.2
Time, total, hrs. & min.	10.25	10.17	....	11.17	9.10	....	....
Time, dead, hrs. & min.	2.18	1.38	....	3.08	2.21	....	....
Running time, hrs. & min.	8.07	8.39	....	8.09	6.49	....	....
Speed, miles per hour	17.3	16.4	5	17.6	20.7	17.6	6.3
Pounds of coal per 1,000 ton-miles (exclusive of engine and tender)	65	45.9	29.4	66.7	47.5	28.8	29.1
Pounds of water per 1,000 ton-miles (exclusive of engine and tender)	571.3	....	....	....	*416.	....	27.2

* Average for all trips.

As a result of their greater economy, the Mikados, though 32 per cent. heavier and much more powerful than the consolidations, burn 21 per cent., or from 2 to 3 tons less coal per trip than the latter, and yet haul 14 per cent. heavier trains at the same or higher speeds.

The trials were in no sense a scientific test to determine the relative efficiency of the two designs. The object was merely to compare the performance of the two classes of locomotives with respect to fuel and water consumed and load and speed in the same service and under average operating conditions, with a view to determining just what average benefits, if any, the Mikados effected in handling the traffic.

All observations were made on the Buffalo division between Elmira and East Buffalo, a distance of 141 miles, the profile of which is shown in the illustration. Records were kept of four runs of each class of locomotive, two in each direction. A short run from Elmira to Mount Morris was also made with one of the consolidations. As this is not exactly comparable with the through runs, the record of this trial is not included in any of the following tabulations of average results, except in Table No. 2, which shows the relative performance from Elmira to Wayland.

TABLE NO. 2.

Comparative Average Results on Easy Grades. Elmira to Wayland (Westbound).

Type.	2-8-0.	2-8-2.	Per cent. Difference.
Distance, miles	62½	62½	....
Time, total, hours and minutes	5.00	4.07	....
Time, delayed, minutes	.48	.41	....
Running time, hours and minutes	4.12	3.26	....
Speed, miles per hour	15	18.25	21.6
Tonnage behind tender	2,989	3,328	11.4
Number of scoops	1,016	826	....
Coal, pounds	17,780	11,977	23.6
Pounds of coal per 1,000 ton-miles (exclusive of engine and tender)	95	57.6	39.3

The consolidation locomotives were comparatively new and have been in service only a year and were in good condition of repair. Whatever advantage there was between the two classes of locomotives in this respect was, of course, however, in favor of the Mikados. To offset this, however, the enginemen were not familiar with the operation of the Mikado locomotives.

Coal was measured by the number of scoops fired, the average weight of a scoopful having first been determined by actual weight. A record of the number of scoops was kept by means of counters.

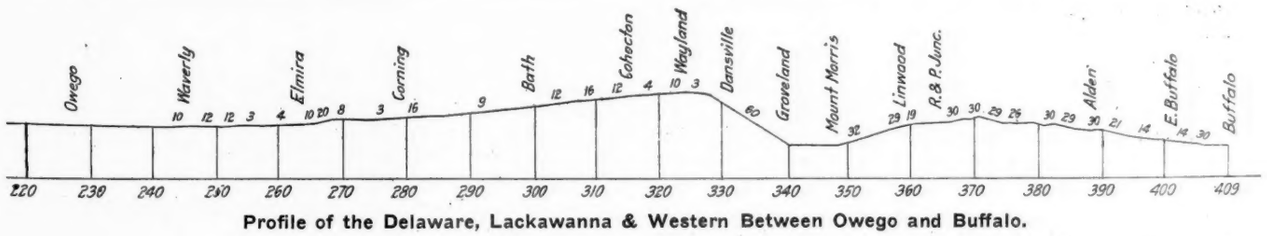
TABLE NO. 3.

Comparative Average Results on Heavy Grades. Cleveland to Wayland (Eastbound).

Type.	2-8-0.	2-8-2.	Per cent. Difference.
Distance, miles	14	14	....
Running time, minutes	80	79	....
Speed, miles per hour	10.4	10.6	....
Tonnage behind tender	2,145	2,550	18.7
Coal fired, pounds	4,687	4,462	4.8
Pounds of coal per 1,000 ton-miles (exclusive of engine and tender)	156	125	20.

On the consolidations a No. 5 scoop was used, the average weight of the scoopful being 17½ lbs.; while the Mikados were fired with a No. 3 scoop, the average weight being 14½ lbs. This is reflected in the results given below in which the difference in the amount of coal burned per trip is much greater than the difference in the number of scoops shoveled. Two firemen were used on the consolidations, which is the regular practice, while one fireman handled the Mikados.

The weight of water per inch of depth in the tanks was ac-



Profile of the Delaware, Lackawanna & Western Between Owego and Buffalo.

curately determined and the water level measured through the manhole.

No attempt was made to surround the tests with special conditions. On every run, both the locomotives and the crew operating them were those assigned in the regular course. A good quality of coal and of the same grade was used on all the runs.

Table No. 1 gives separately a summary of the average results of the westbound and eastbound trips; also the percentage difference. It will be observed that the Mikados made a decidedly better performance in tonnage handled and consumption of coal. They showed up splendidly in the test, steamed freely and handled the train perfectly at all times. They burned from 19 to 21 per cent. less coal per trip than the lighter consolidations, and they hauled from 11 to 16 per cent. heavier trains. Westbound there was little difference in the total time, running time and speed between the two classes of engines, though the Mikados averaged 40 minutes less delayed time. Eastbound the Mikados took their heavier trains over the road in considerably faster time than the consolidations.

On the westbound trips, the solid train was taken through from terminal to terminal in all cases; but, eastbound, cars were switched off and taken up at various points en route. The work done per trip by the locomotives is consequently expressed in each case in ton-miles. It is interesting to compare the performance of the two classes of locomotives over particular portions of the division showing their relative merits under varying grade conditions.

Table No. 2 gives a summary of the comparative performance of the two classes westbound between Elmira and Wayland, a distance of 62½ miles. From the profile it will be seen that most of this distance is an easy ascent averaging about .2 per cent. with some short down grades and level stretches. Under these conditions the Mikados hauled a 11 per cent. heavier train at 21½ per cent. higher speed and burned 23½ per cent. less coal. This gives an average saving of 39 per cent. per 1,000 ton-miles.

TABLE NO. 4.

Comparison of Principal Dimensions.

Type.	2-8-2.	2-8-0.
Cylinders, diam. and stroke, in.	28 × 30	26 × 30
Driving wheels, diam. in.	63	57
Boiler, outside diam., front end, in.	86⅛	81½
Boiler pressure, lbs.	180	170
Firebox, length, in.	108	111⅛
Firebox, width, in.	84¼	75¼
Tubes, number and diameter	304-2	445-2
Flues, number and diameter	43-5⅜	....
Tubes and flues, length, ft. & in.	21	15-2
Heating surface, tubes, sq. ft.	4,593	3,513
Heating surface, firebox, sq. ft.	261	202
Heating surface, total, sq. ft.	4,854	3,715
Grate area, sq. ft.	63	58.2
Superheating surface, sq. ft.	1,085	....
Weight on driving wheels, lbs.	236,500	210.500
Weight on leading truck, lbs.	27,500	25,500
Weight on trailing truck, lbs.	48,000	....
Weight, total of engine, lbs.	312,000	236,000
Weight of tender, lbs.	159,700	157,300
Wheel-base, driving, ft. & in.	17-0	17-6
Wheel-base, engine, ft. & in.	35-2	26-5
Wheel-base, engine and tender, ft. & in.	67-3½	60-11
Maximum tractive effort, lbs.	57.100	51,400

A comparison of the performance of the two classes of locomotives under heavy grade conditions is shown in Table No. 3, which gives the average results running from Groveland to Wayland, a distance of 14 miles, all but two miles of which is an ascending grade averaging 1.09 per cent.. Consolidations were used as helpers on this grade for both classes of locomotives. It will be seen that under these conditions the Mikados hauled 18 per cent. more tonnage than the consolidation at the same speed, and burned a little less coal. The Mikados showed a saving of 20 per cent. in coal per 1,000 ton-miles.

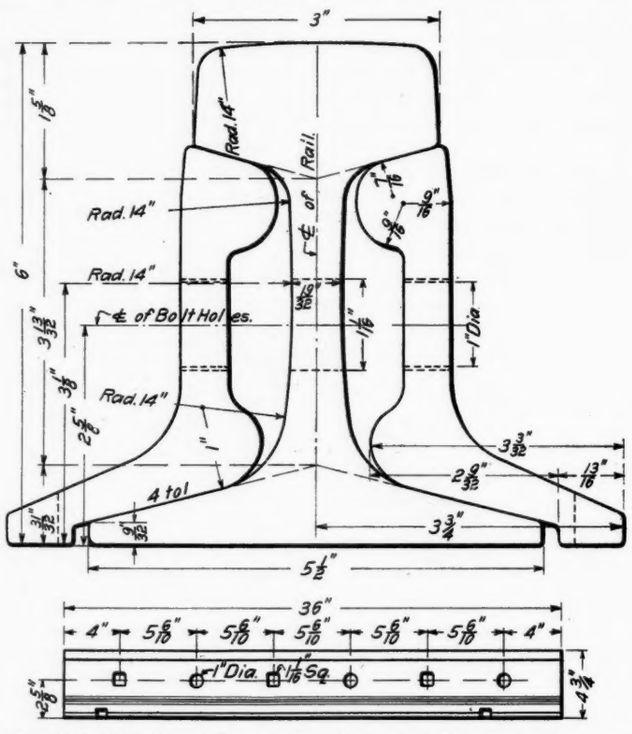
As a result of the introduction of the new engines, helper service on the Groveland grade has been reduced, and three of the helpers formerly used have been released for road service.

The Mikados are equipped with superheaters having 1,085 sq. ft. of heating surface, as well as brick arches. The consolidations have neither superheaters nor brick arches, and as far as details and general design are concerned, represent, in the main, the common conventional practice for locomotives of their type.

A comparison of the principal dimensions of the two classes of engines is given in Table No. 4.

NEW 105-LB. RAIL FOR THE NEW YORK CENTRAL LINES.

The accompanying drawing shows the 105 lb. rail section of the New York Central & Hudson River which has recently been made standard on that road, and which will be used in rolling the rails for 1913 use. This section is the same as the New York Central lines' standard 100 lb. section, with the exception of the increased fillet between the web and the base, which adds 5 lbs. per yard to its weight. While comparatively few half moon or crescent breaks in the base have occurred with the old 100 lb. section rolled of basic open hearth steel, it is believed that the new section will decrease this number still further. It is believed that the increased strength given to the base at the junction with the web in the new section will provide more fully for the ordinary average increase in the wheel loads for sometime to come. This section is similar in design to the revised 90 lb. section described in the issue of the *Railway Age Gazette* of August 12, 1912.



New 105-lb. Rail and Angle Bar; New York Central & Hudson River.

Construction Work in Haiti.—The first section of the railway which is now being constructed through Haiti has been completed and accepted by the government. The completed division extends from Cape Haitien to La Grande Riviere, while the section from Gonaives to Ennery is also almost ready. A 60-ton Baldwin locomotive is now at work aiding in laying the tracks on this line.

General News.

A strike was declared on the Georgia Railroad at 6:30 p. m. October 2. A press despatch from Atlanta says that all trains were stopped and that for a time traffic was completely tied up.

In connection with the National Conservation Congress which is being held in Indianapolis this week there is an extensive exhibit of sanitary railroad cars in a yard west of the Union Station.

Instead of abolishing grade crossings Kansas is to put a pair of thank-e-ma'ams at each railway crossing to make automobiles slow down. If the railroads should be similarly humped, travel in Kansas would at least be exciting.—*Springfield Republican.*

The Philadelphia & Reading announces that beginning on the first of next January the use of lead and wire car seals will be discontinued, the company having adopted the Tyden seal, which is applied without the use of a seal press. Shippers who seal their own cars are advised to use the Tyden seals.

The Great Northern has ordered from the Western Electric Company apparatus for the equipment of a telephone despatching line 240 miles long. The despatcher will be located at the center of this line and there will be 25 stations. The Temiskaming & Northern Ontario has given a similar order for 290 miles, and the Buffalo, Rochester & Pittsburgh one for 125 miles.

The losses sustained by the Mexico North Western in consequence of the recent revolutions in that country are reported as amounting to $3,000,000 (gold), and those of the Madera Lumber Company, owned by the same interest, at $1,000,000 (gold). The line of the railway has been finished as far as Nuevo Casas Grandes; but all further extensions have been abandoned for the present.

The action of the coroner's jury at Corning, N. Y., in deciding that no person was criminally responsible for the collision near that place on July 4, appears not to have settled the matter, as, according to a press despatch of September 27, the grand jury has filed in the Supreme Court an indictment of engineman Schroeder. The grand jury found no indictment against flagman Lane.

The law for the elimination of highway grade crossings in New Jersey, which was passed by the legislature last winter, has been declared invalid, in a decision by Chief Justice Gummere, handed down September 27. The law had been vetoed by Governor Wilson, but the veto was not properly sent, and the officers of the state had been in doubt as to whether or not the statute was in effect.

Detectives of the West Shore Railroad and of New York City have arrested two men who, they say, have within the past three months, stolen fifteen or twenty thousand dollars' worth of silver from private cars standing in railway yards. These robberies began with the theft of $5,000 worth of silver from a car belonging to George J. Gould, which was standing in the yard at Weehawken last July.

The Pennsylvania Terminal Real Estate Company has been incorporated at Albany, N. Y., with a capital of $3,000,000. Samuel Rea, vice-president of the Pennsylvania Railroad, and one of the directors of the new company, says that it was formed to develop the property of the Pennsylvania Tunnel & Terminal Railroad Company adjoining the Pennsylvania station in New York City. The inducement now to proceed with these improvements was the adoption by the city of its subway plans, which mean rapid transit for the west side (Seventh avenue).

The annual track inspection of the Pennsylvania Lines, both east and west of Pittsburgh, is being made this week. The first trip was made on Wednesday, starting from Pittsburgh. The route thence to Chicago was by way of the southwest lines to Coshocton thence to Loudonville, and from there to Chicago over the main line of the Fort Wayne. The party, numbering about 200, disbanded at Chicago after a dinner at the Hotel La Salle on Wednesday evening. The inspection east of Pittsburgh was begun at Pittsburgh, Thursday morning. Thence to New York, over the main line, the party occupying six special trains.

President B. A. Worthington, of the Chicago & Alton, addressed a meeting of the Sunday Union of the Brotherhood of Locomotive Engineers on Sunday, September 29, in the rooms of the Permanent Manufacturers' Exhibit of Railway Supplies and Equipment in the Karpen building, Chicago. Mr. Worthington spoke on the subject of the relations between the railways and the public, and predicted a serious business depression in the future unless the present attitude of the public toward the railways is changed for the better. He urged railway men to be on the lookout for opportunities to refute unfair statements reflecting on the railways and their management.

The Erie Railroad has purchased the American Locomotive Company's experimental Pacific type locomotive No. 50,000, which was designed and constructed by the builders at their own expense for the purpose of obtaining information as to the possibilities of increased capacity and improved economy in passenger locomotives for difficult service through the application of the latest knowledge in general proportions, details of design, materials and fuel saving devices. The locomotive was fully described in the *Railway Age Gazette* of December 29, 1911, page 1322. In service tests it showed 13 per cent. greater average economy compared with another Pacific of like weight equipped with the same fuel saving devices, though not developed to the same degree, and over 25 per cent. greater economy than one of conventional design. Its success in service last winter on the Erie (*Railway Age Gazette,* March 29, 1912, page 739) in maintaining a most difficult schedule under the worst weather conditions experienced in years, demonstrated its exceptional capacity. The influence which this engine has had on subsequent locomotive design marks it as a distinct advance in locomotive engineering. It introduced a number of improvements in detail construction which are being widely adopted by the railways throughout the country.

Strike of Railway Employees in Spain.

A strike of railway employees in Catalonia which was begun September 25, has seriously disturbed railway traffic throughout the north and east of Spain. There was considerable disorder, and at Barcelona the city was put in charge of the military. Telegraph wires were cut, and later were repaired by the troops, only to be cut again. Despatches indicate that the mail trains were in most places kept running, but only with difficulty. On Wednesday of this week matters were reported improved at Seville, but still unsettled at Barcelona and Valencia. Large quantities of perishable freight were spoiled by the delay.

Co-operative Safety Congress at Milwaukee.

The First Co-operative Safety Congress was held at the Hotel Pfister, Milwaukee, Wis., during the week September 30 to October 5, at the invitation of the Association of Iron and Steel Electrical Engineers and for the purpose of forming a permanent organization.

On Monday evening was held the first annual safety dinner of the association, which was devoted to discussions of methods of promoting safety, and the programme for the rest of the week was divided into sessions devoted to the various branches of industry.

On Tuesday morning was held the federal session, presided over by Dr. L. W. Chaney, Department of Commerce and Labor, as chairman. Chief Inspector Belnap of the Interstate Commerce Commission read an extensive address on "The Work of the Federal Government in Preventing Railway Accidents and its Results," which was prepared by C. C. McChord of the Interstate Commerce Commission, and which reviewed the development of the present federal laws enacted in the interest of safety on railways, and presented statistics to show the effects of such legislation. An abstract of Mr. McChord's paper is presented elsewhere in this issue.

Tuesday afternoon was devoted to the States Session, at which W. F. Houk, Commissioner of Labor of Minnesota, presided as chairman. On Wednesday morning was held a Mines' Session, presided over by Dr. Jos. Holmes, director of Bureau of Mines, as chairman, and at which a number of addresses relating to safety work in the various mine districts were presented.

Wednesday afternoon was devoted to the Transportation Session, at which R. C. Richards, chairman of the Central Safety

Committee of the Chicago & North Western was chairman Mr. Richards opened the session with a discussion of the safety movement, which was first introduced on the Chicago & North Western. He said that 32,000 men were killed and 2,000,000 injured each year in peaceful industries in the United States, or during the four days the Safety Congress was in session 384 workmen would be killed and 23,000 injured. While the railways are severely criticised for their accident records it is because they are forced to make their records public. As a matter of fact they are responsible for only one-tenth of the number of workmen killed in this country, and of only one-sixteenth of those injured. The safety movement in the railways is rapidly extending and safety committees are now at work on 144,000 miles of railway. A paper was presented by A. Hunter Boyd, Jr., chairman of the General Safety Committee of the Baltimore & Ohio Railroad, on "Accidents Attributable to the Carelessness of Employees and How Best to Prevent Them." In discussing it A. A. Krause, general claim attorney of the Missouri, Kansas & Texas, and G. F. Baker, assistant general adjuster of the Chicago, Milwaukee & St. Paul, urged that more attention be given to moral characteristics in selecting employees. Mr. Baker announced that his road is now organizing safety committees. George Bradshaw, general safety agent of the New York Central Lines, presented a paper on the "Prevention of Accidents in Railway Shops and Roundhouses," in which he described several methods of safeguarding machinery as a necessary means of promoting safety in railway shops.

S. M. Braden, general superintendent of the Chicago & North Western, read a paper on the "Prevention of Accidents to Trainmen". He emphasized the necessity of arousing and sustaining interest among employees and said that the tendency of unions was to interfere with discipline. The men co-operate heartily. In nineteen months to June 30, 1912, there was a reduction of 27.8 per cent. in killed, and 31.2 per cent. in injured on the North Western system. Railways are waiting for the automatic train control to be made fool proof and practical. E. F. Potter, assistant to general manager of the Soo Line, urged a more uniform discipline as in the army. Automatic devices do not remove the human element, but transfer responsibility from the engineman to the less paid maintainer. J. W. Coon, assistant general manager, Baltimore & Ohio, said men should be tested as strictly as materials. Ninety-one per cent. of the accidents in the past year on the Baltimore & Ohio were due to causes over which the company had no control. H. W. Belnap said he was greatly interested in the safety movement and commended the co-operation of roads with his inspectors. Abstracts of the papers of Messrs. Boyd, Bradshaw and Braden will be published in the *Railway Age Gazette* of October 11.

On Thursday morning was held the Manufacturers' Session, presided over by John Kirby, Jr., president of the National Association of Manufacturers, and the Thursday afternoon session, which was called the Allied Association Session, was presided over by F. C. Schwedtman, president of the Citizens' Industrial Association. This session included a demonstration of safety methods by moving pictures.

The programme for Friday provided for an Iron and Steel Session and safety exhibit representing the safety work of the United States Steel Corporation.

Government Report on Derailment at West Lebanon.

The Interstate Commerce Commission has this week issued a report, dated August 19, on the derailment of a westbound passenger train which occurred on the Wabash Railroad near West Lebanon, Ind., March 7, last. The report is by Chief Inspector Belnap and by James E. Howard, engineer of the Bureau of Standards. In this derailment the entire train except the locomotive and the tender fell down a bank, and two passengers were killed. It was due to a broken rail. The train was running about 35 miles an hour and the rails were A. S. C. E. 80-lb., 33 ft. long, laid on hard wood ties about 18 ties to the rail. The rail which broke was on the outside of a curve of 2 deg., and it was much worn, the flanges of the wheels having worn off about 27 per cent. of the head. About a month before the accident tie plates had been put under the rails because of the worn condition of the ties and of the spikes on the outside. Testimony given at a coroner's inquest is cited to the effect that many of the ties in the vicinity were decayed and that none were changed when the tie plates were put in. The ground was then frozen hard and continued frozen until the day of the accident. There was irregularity in the surface of the track, which, "no doubt contributed to the failure of the rail." The rail was made by the Illinois Steel Company in 1903 and is supposed to have been laid in August, 1904, the record not being exact in this feature. About 7 ft. in the middle of the rail was broken into six pieces.

The report of Mr. Howard says that the weight of the engine was 180,700 lbs. and the weight on the drivers (Atlantic type) was 96,700 lbs. The immediate cause of the failure of the rail is attributed to the seaminess of the metal in the base, which induced a fracture. The rail was weakened by reason of the presence of the seam, and yielded under a load which sound metal would have sustained without fracture. After discussing the appearance and condition of the several fragments of the rail, which are illustrated by photographic cuts, Mr. Howard concluded as follows:

"Such fractures are numbered by the thousands. From statistics it appears that not less than 80 per cent. of broken rails reported, covering certain periods, were of the type here encountered.

"Herein is exhibited a structural defect which is prevalent, to a marked degree, in many rails. It is a defect the presence of which is well recognized and admitted. It has been the cause of occasional wrecks and a large number of renewals of rails. Notwithstanding these circumstances, rails are accepted under specifications and tests in which this, the most common cause for breakage, is not guarded against. Revisions of specifications have gone on still omitting reference to this prolific cause of rail failures.

"An overwhelming majority of rail failures is reported as due to base fractures, fractures which disclose the presence of streaks and seams in the steel. This seaminess of the metal can be revealed by crosswise bending of the flanges, and such a test for structural soundness is easily made. In fact such a method of examination has been employed in the past by the undersigned to show the prevalence of streaks in rails which had or had not displayed seamy fractures in the track. Tests governing the acceptance of a finished product should undoubtedly be directed to show the fitness of that product against its most common manner of failure in service."

The Proposed Union Station in Toronto.

The long pending arrangements for the construction of a union station at Toronto, Ont., seem destined to further delay. Following a conference last week the railway commission has called on the Grand Trunk and the Canadian Pacific to present within three weeks a joint statement showing the exact status of the negotiations between the two companies regarding the project. In the meantime the railways announce that they will have entered an appeal to the Governor-General in Council against the viaduct order, thereby reopening the whole viaduct and union station issue. The Canadian Pacific declares that it is not party to any order respecting the union station yet made by the commission and therefore is not subject to the present order. The road's counsel declared that the determination of the plans for the union station depended entirely on whether or not the viaduct scheme was to be carried out, and reiterated the unalterable opposition of his company to that scheme. The plans could not be decided until the track level was fixed. It is expected that the railways will ask for the appointment of a board of three independent engineers of acknowledged eminence to prepare a joint recommendation. Such a board could report in time for work to be begun in the Spring.

President Fowler's Adieu.

T. P. Fowler, late president of the New York, Ontario & Western, has sent to General Superintendent Edward Canfield a letter conveying his good wishes to the faithful and loyal employees of the road; and he says, in part:

"There are no doubt young men now in our service who were not born when I was first elected president, twenty-six years ago. My association with you and other old friends for so long a period is indeed a precious memory. I have been treated by all,

from those holding the highest to the lowest positions, during all this time, with uniform kindness, courtesy and consideration. In taking leave, I thank you and them, and I am sure that your good will and theirs will be extended to my successor, Mr. Mellen, who is entitled to your esteem and loyalty.

"Mr. Mellen began railway work in the lower ranks, and there is no one whom I know who has more sympathy or who appreciates more fully the trials and sometimes the hardships which railway employees faithful in their work, are called upon to endure.

"Although no longer associated with you, I shall continue to take a deep interest in the prosperity of the company, and in the personal welfare of its officials and employees in all departments."

Difficulties with English in England.

Passenger—Why are we so late?

Guard—Well, sir, the train in front was behind, and this train was behind before besides.—*Punch.*

Dynamometer Car for the Japanese Government Railway.

Professor E. C. Schmidt, in charge of the department of railway engineering of the University of Illinois, has been commissioned by the Japanese government to design a railway dynamometer car for the Imperial Government Railways. The car will be built in this country under the supervision of Professor Schmidt, and is expected to be delivered next spring to the representative of the Japanese government.

The car is to be 48 ft. long, 8 ft. 6 in. wide, adapted at present for 3 ft. 6 in. gage, with provision for changing later to 4 ft. 8½ in. gage. It is to be equipped with vacuum brakes, and the design of such details as drawbar, buffers, journal boxes, etc., is to conform to Japanese railway standards. The car is to be of the hydraulic dynamometer type, such as has been developed at the University of Illinois. The recording apparatus will permit the measurement of tractive efforts up to 80,000 lbs., and will provide also for the measurement of speed, time, distance, vibration, buffer thrust, etc. The car and the apparatus will be designed for a maximum speed of 85 m. p. h. An axle generator and storage battery will be provided to supply current for operating the recording apparatus and for lighting purposes.

The work has been undertaken at the instance of S. Matsuno, chief of the motive power section of the central division of the Japanese Imperial Government Railways, who has supplied the general specifications for the design.

Non-Residents Taxed for Highways.

Thrasher & Gunter of Knoxville, the contractors who are double tracking the Louisville & Nashville have applied to the federal court for an injunction to prevent their non-resident laborers from working on the public roads of Blount county. The contractors claim they have lost $3,000 by reason of the road law and its resultant practice of arresting non-residents and making them do road duty. The petition further recites that the road law of Alabama is in conflict with the United States constitution. Judge W. I. Grubb granted a temporary injunction. The Alabama road law assesses a road tax of $4 upon non-residents, which upon refusal means that non-residents are forced to work on the county roads for four days.—*Birmingham Age Herald.*

More Laws Being Made.

Revision of the compensation and the standard caboose acts and legislation on a "full crew" bill will be asked by the Brotherhood of Railway Trainmen as the result of a three-day legislative conference of forty-five delegates which adjourned yesterday (at Springfield, Ill). The brotherhood will also ask for a semi-monthly pay day and for the abolishment of bulletins which require brakemen to go in the rear of a train when it stops. This bulletin has been recently issued on some railways, and it is thought will be taken up by others. The "full crew" bill will apply to yard and road service. The "standard caboose" bill will be revised, if the brotherhood is successful, so that it will call for larger cabooses. The brotherhood would revise the compensation act.—*Illinois State Journal.*

Utah Society of Engineers.

At the meeting of the Utah Society of Engineers at Salt Lake City, Utah, to be held on November 15, the general subject for consideration will be Electric Power Supply for Utah. The following papers will be submitted: Hydro-Electro Power Resources Tributary to Salt Lake City, by D. H. Randall, of the General Electric Company; Factors Determining Cost of Hydro-Electro Service, by Markham Cheever, of the Telluride Power Company; Continuity of Hydro-Electro Power Service, by Leonard Wilson, consulting engineer; Modern Steam Relay Station, by C. A. Cohn, of the Utah Light & Railway Company, and Modern Transmission Practice, by G. W. Riter, of the Utah Light & Railway Company. At the meeting of the society to be held on December 20, the subject will be the Principal Metal Mining District of Utah, Geology, Statistics and Future.

American Society of Mechanical Engineers.

At a meeting of the American Society of Mechanical Engineers, to be held on October 8, at New York, there will be a discussion on Smoke Abatement, to be opened by George H. Perkins, of the engineering department of the Lowell Textile School, who attended the International Smoke Abatement Exhibition and Conference held in London in March, as the representative of the society and of the city of Lowell.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held on October 2, 1912, a paper by H. G. Burrowes, M. Am. Soc. C. E., on The Sixth Avenue Subway of the Hudson & Manhattan, was presented for discussion, and was illustrated with lantern slides. This paper was printed in *Proceedings* for August, 1912.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May, 1913, St. Louis, Mo.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—E. H. Harman, St. Louis, Mo.; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York; annual, November 20, 1912, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Meeting Dec. 10-11, 1912, New Orleans, La.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed, preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.

MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa. Convention, November 19-21, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Convention, May, 1913, Chicago.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York; annual, November 20, 1912, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo. Next meeting, Nov. 17, 1912, Cincinnati, Ohio.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Convention, Oct. 8-11, Quebec.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. AND TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; annual, October 23-25, Atlantic City, N. J.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, Oct. 17, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.

UTAH SOCIETY OF ENGINEERS.—R. B. Ketchum, University of Utah, Salt Lake City, Utah; 3d Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The California terminal railways have decided to offer the same homeseekers' fares to points in California during 1913 as have been in effect this year.

The Chicago, Indiana & Southern, in connection with the Big Four, Louisville & Nashville and connections, restored its through package car service via Evansville, Ind., to Memphis and Nashville, Tenn., on October 1.

The Texas Midland announces that a passenger motor car is to be run regularly between Paris and Dallas, 117 miles, a contract having been made with the Texas & Pacific for running the car over that company's line between Terrell and Dallas, 30 miles.

The Canadian government reports that new settlers arriving in that country from the United States this year have numbered 73,209, which is 10 per cent. greater than the number who came last year. It is said that these immigrants took with them into Canada money and property aggregating a hundred and ten millions.

The "American Chain of Warehouses" is the title which has been adopted by public warehouses in fifty of the principal cities of the country for the purpose of accommodating shippers who may desire uniform rates and treatment in all parts of the country. The headquarters of the combination is with The F. C. Linde Company, New York.

A farewell luncheon will be tendered by the Traffic Club of Chicago on October 15 to B. C. Stevenson, who has been elected vice-president of the Toledo, St. Louis & Western, with office at Toledo, Ohio, and J. A. Tapee, who will leave Chicago to become assistant traffic manager of the western plants of Nelson Morris & Company, with office at Kansas City.

It is announced that the Sunset Limited, the Southern Pacific's fast train between New Orleans and San Francisco which was put into service during the winter of 1911 and 1912, running twice a week, will be reinstated this winter on a schedule of one train each way a week. The first westbound train will leave New Orleans on January 2, and the first eastbound train will leave San Francisco on January 7. An extra fare will be charged.

The Pennsylvania, like all other roads, is urging shippers and consignees to economize cars; and it is also doing something itself. It has 27,000 employees engaged on the rush orders to put all cars and locomotives in first class condition, and to get them out on the road. In the company's shops 11,500 men are repairing freight cars and 1,225 are building new ones; more than 10,000 are repairing locomotives, while 1,350 are constructing new ones. Some 2,800 men are now working on passenger cars.

William L. Divine, general forwarding freight agent of the Chesapeake & Ohio, has been fined by Judge Mayer, in the criminal branch of the federal district court, $15,000 on a plea of guilty to the charge of granting rebates through an agreement with a forwarding firm, which firm, it was charged, were paid a commission on business which they secured and shipped over the C. & O.

During the last few years the Ontario government, with the co-operation of the Grand Trunk Railway, has planted in the lakes in the highlands of Ontario thousands of parent fish for the purpose of increasing the supply in these waters. A special fish car was built a few years ago by the Grand Trunk for the transportation of these fish. The government has recently been operating fish hatcheries with very successful results, and in the last season for re-stocking has put 74,000 black bass fingerlings in Muskoka Lakes, Gull Lake, Sturgeon, Cameron, Balsam, Fair, Vernon, Peninsula and Mary lakes, and the laes reached by the Temiskaming & Northern Ontario.

The seventh annual convention of the Lakes-to-the-Gulf Deep Waterways Association, which has been held at Little Rock, Ark., adjourned on September 26 to meet at Peoria, Ill., next fall. Resolutions were adopted in part as follows: "We re-

iterate our demand on the legislative and executive branches of the federal government for the speedy completion of the deep waterway, connecting the Great Lakes with the Gulf of Mexico, as the main commercial artery of the country. And we declare our fixed determination to secure this inestimable source of national prosperity, regardless of all opposition and despite antagonism based on obsolete and ancient standards and ideals. We demand results and any and all changes necessary to obtain them."

The Illinois Traction System has filed a tariff with the Interstate Commerce Commission, effective about the end of this month, providing for rates on coal from the Mt. Olive district in Illinois to St. Louis, which represent a reduction of about 10 per cent. under the rates charged by the competing steam railways. The company has been making extensive preparations for handling a heavy movement of coal into the city of St. Louis over its own bridge across the Mississippi river, the coal to be unloaded at chutes in the St. Louis terminal yards of the electric line. The company is making an effort to obtain franchises for switching facilities, and it is announced that if the franchises are granted it will deliver coal at any coal yard or depot in the city. The company has previously handled coal shipments on a small scale.

The tours department of the Chicago & North Western and Union Pacific has announced that a new train, to be called the "Sunrise to Sunset Daylight Special," will be put in service between Chicago and southern California in the early part of February, 1913. The principal feature of the new train is that it will travel only during the daytime, parking at certain points en route at nightfall and resuming its journey the next morning. It will reach Riverside, Cal., the evening of the fifth day. The train is intended to meet the requirements of people who are in no hurry, and whose only purpose in taking the fast trains has been to secure the better accommodations afforded. The train will carry only drawing room and compartment sleeping cars, buffet-library-smoking car, dining car and parlor-observation car. It will have a stenographer, a lady's maid, a barber and a bath.

The traveling farmers' instruction train, run for the purpose of lecturing on specialties, is now superseded by the "Mixed Farming Special," devoted to all sorts of work. This is the name of a train to be run throughout western Canada during the month of November over the lines of the Canadian Pacific. The enterprise is being managed by the government under the direction of the minister of agriculture for Alberta. The need of the wheat farmers of the west is believed to be an incentive to more diversified farming. The lecture train will have two carloads of animals, two passenger cars fitted up for lecture rooms, a baggage car for the display of grains, grasses, weeds and other things, and a car of poultry; and a sleeping car, a dining car and a baggage car. It is proposed to stop about three hours at each town that is visited. The display of noxious weeds is to be called to the attention not only of the farmer, but of the railway section foremen, with a view to promoting the maintenance of a cleaner and better looking right of way.

The Parcel Post Traffic.

The establishment of a limited parcel post system is announced for inauguration in this country about the first of January. The first zone distance is 50 miles, and in this zone, an 11 lb. package will be carried for thirty-five cents. A study of the plan makes it appear that the express companies have little to fear provided the Bourne rates [named in the law] remain in effect. It seems likely that while the post office will collect a large number of packages weighing from 1 to 5 lbs., transport them about 50 miles and then deliver them, the express companies will be the sole operators in the large field of commercial express, the transporting of large packages and of reasonably small packages for long distances. In a report of the Interstate Commerce Commission, the average distance a package of any size is now hauled by the express company is given as about 200 miles, and the average rate paid, 50 cents. The greater volume of express traffic is for short distances, and one-half of the business moved consists of packages under 20 lbs. in weight. It is safe to assume that the parcel post will not make material inroads upon the present business of the express companies.—*Express Gazette.*

REVENUES AND EXPENSES OF EXPRESS COMPANIES AS REPORTED TO THE INTERSTATE COMMERCE COMMISSION.

	Miles of line covered.		Express revenue.	Gross receipts from operation.	Less express privileges. Dr.	Total operating revenues.	Operating expenses.				Net operating revenue (or deficit —).	Taxes.	Operating income (or loss —).	Increase or decr. (—) comp. with last year.
	Steam roads.	Other lines.					Maintenance.	Traffic.	Transportation.	General.	Total.			
MONTH OF FEBRUARY, 1912.														
Adams Express Co.	33,009[1]	4,843	$2,433,206	$2,468,230	$1,283,101	$1,185,129	$59,993	$9,606	$1,058,920	$82,377	$1,210,896	—$25,767	$20,018	—$45,785	6,729
American Express Co.	55,131[2]	1,840	2,935,524	3,065,473	1,436,209	1,629,264	22,763	31,506	1,451,937	128,925	1,635,131	—5,867	33,688	—39,555	—29,484
Canadian Express Co.	6,122[12]	830	176,526	180,754	80,864	99,890	7,862	1,332	91,183	7,705	108,082	—8,192	2,250	—10,442	—8,317
Canadian Northern Express Co.	4,022[3]	22	39,736	41,260	15,894	25,366	160	391	12,522	2,015	15,088	10,278	540	9,738	5,103
Globe Express Co.	2,904[4]	...	46,578	47,573	23,298	24,275	619	1,683	22,897	3,746	28,945	—4,670	650	—5,320	1,822
Great Northern Express Co.	8,497[5]	399	179,120	181,456	117,111	64,345	1,767	2,041	65,277	4,071	73,156	—8,811	2,278	—11,089	3,582
National Express Co.	1,409[6]	70	80,548	80,920	37,395	43,525	1,153	...	46,650	2,995	50,798	—7,273	497	—7,770	—9,154
Northern Express Co.	7,310[7]	315	180,066	182,796	92,906	89,890	4,022	3,317	70,680	6,119	84,138	5,752	4,500	1,252	1,483
Southern Express Co.	31,991[8]	821	1,227,256	1,250,947	635,702	615,245	18,778	9,853	425,743	74,627	529,001	86,244	12,756	73,488	—70,859
United States Express Co.	29,104[9]	3,954	1,469,124	1,492,926	715,733	777,193	30,166	22,056	792,127	55,966	898,315	—121,122	13,957	—135,079	—41,100
Wells, Fargo & Co.	63,765[10]	17,339	2,402,816	2,444,393	1,163,081	1,281,312	36,772	28,640	1,006,027	93,125	1,164,564	116,748	24,750	91,998	—301
Western Express Co.	4,892[11]	4	70,070	71,538	38,880	32,658	1,265	2,448	31,312	3,205	38,230	—5,572	757	—6,329	8,665
EIGHT MONTHS OF FISCAL YEAR, 1912.														
Adams Express Co.	33,009[1]	4,843	$22,148,320	$22,419,694	$11,443,336	$10,976,358	$571,949	$68,491	$8,794,818	$671,382	$10,106,640	$869,718	$157,351	$712,367	—$24,230
American Express Co.	55,131[2]	1,840	27,370,132	28,526,277	13,206,103	15,320,174	352,905	239,415	11,787,085	992,660	13,372,065	1,948,109	256,236	1,691,873	—119,108
Canadian Express Co.	6,122[12]	830	1,899,347	1,941,550	904,808	1,036,742	48,786	9,676	758,943	57,440	874,845	161,897	18,000	143,897	—28,617
Canadian Northern Express Co.	4,022[3]	22	375,773	389,394	150,880	238,514	1,462	3,351	112,050	12,196	129,059	109,455	2,351	107,104	26,623
Globe Express Co.	2,904[4]	...	522,071	527,816	262,636	265,180	5,174	13,184	197,397	33,537	249,292	15,888	6,250	9,638	—21,553
Great Northern Express Co.	8,497[5]	399	1,870,763	1,884,771	1,156,786	727,985	13,255	11,624	555,436	31,613	611,928	116,057	24,831	91,226	—41,427
National Express	1,409[6]	70	836,531	840,286	328,210	512,076	7,227	7	392,837	24,510	424,581	87,495	3,882	83,613	—9,341
Northern Express Co.	7,310[7]	315	1,932,119	1,958,090	995,638	962,452	14,616	26,728	623,299	47,830	712,473	249,979	36,000	213,979	—166,879
Southern Express Co.	31,991[8]	821	9,919,298	10,110,161	4,859,458	5,250,703	162,349	74,758	3,433,995	487,075	4,158,177	1,092,526	114,909	977,617	—210,603
United States Express Co.	29,104[9]	3,954	13,821,040	14,033,908	6,482,606	7,551,302	266,487	132,037	6,600,867	381,085	7,380,476	170,826	82,587	88,239	—282,722
Wells, Fargo & Co.	63,765[10]	17,339	20,776,002	21,151,015	10,004,687	11,146,328	357,286	208,329	8,131,374	686,581	9,403,570	1,742,758	197,949	1,544,809	—95,638
Western Express Co.	4,892[11]	4	731,142	744,472	387,373	357,099	8,517	23,618	278,859	27,200	338,194	18,905	6,156	12,749	40,163

Operated in previous period: Steam Roads—[1] 32,717; [2] 54,158; [12] 6,964; [3] 3,369; [4] 2,843; [5] 8,270; [6] 1,422; [7] 6,601; [8] 31,648; [9] 28,854; [10] 46,861; [11] 4,765. Other Lines—[1] 3,727; [2] 1,643; [8] 360; [7] 261; [8] 816; [9] 3,866; [10] 4,492.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until March 28 certain freight tariffs naming increased rates from points in Pennsylvania and New York to St. Paul.

The commission has suspended until January 20 notices filed by the New York Central canceling the free lighterage privilege on hay and straw at New York.

The Interstate Commerce Commission has further suspended from September 28, until March 28, the proposed advances in class rates from points in Pennsylvania and New York to St. Paul, Minn.

The Interstate Commerce Commission has further suspended, from September 28 until March 28, advances in rates on flaxseed from Minneapolis, Minn., and other points, to Chicago and other destinations.

The commission has suspended from October 1 until January 29 advances in rates on cartridge shells, carload lots, to Missouri river points and points in Kansas. The proposed advances were five cents per 100 lbs.

The commission has suspended until January 28 certain tariffs on lumber and shingles, from north Pacific coast points eastward, in which the storage and reconsignment privileges heretofore allowed at St. Paul does not appear.

The commission has suspended from September 30 to January 28 tariffs which eliminate the present reconsignment and storage privileges on lumber and shingles shipped from north Pacific coast territory to Minnesota points and states east.

The Chicago Board of Trade has filed a complaint with the Interstate Commerce Commission against the Illinois Central, alleging that the grain rates of that carrier from Missouri river points on grain originating beyond are unjust and unreasonable *per se*, and unduly discriminatory in favor of New Orleans and other markets.

The Decision in the Dispute on the Differential on Colorado Traffic.

Commissioner E. E. Clark, who was selected to arbitrate the dispute between the rail and water lines operating from the Atlantic Seaboard via the South Atlantic and Gulf ports to Colorado common points has handed down his decision in part as follows:

"I do not think that the facts and conditions are shown to be such as to warrant awarding the Gulf Lines differentials under the Atlantic port lines on Atlantic Seaboard-Colorado traffic. The existing adjustment is of long standing. Proposals to change it have from time to time been made by interested carriers, but it has remained unchanged or has been returned to after temporary disturbances. I am convinced that it should not be changed as proposed except upon affirmative showing that it is inequitable and that the change would not create more inequity than can be found in the present situation.

"While the through rates are the same via the several ports, the steamship lines that originate the traffic make arrangements with their several rail connections for division of the rates and in arrangements each carrier makes the best bargain it can for itself. Taking into consideration the extent of the Atlantic Seaboard territory and the competitive conditions under which the traffic is secured, the only question in this issue is that of rates via ocean and rail lines from the Atlantic Seaboard territory.

"It can hardly be said that a railroad located in a particular section of the country has any claim of right to be given any part of the tonnage originating in a territory which it does not serve and which can reach its destination via lines that do serve the territory of origin. A railroad like any other enterprise is entitled to the advantages and must bear the disadvantages of its location. When we consider the strategic positions of the lines operating through the Virginia cities, with terminal at Norfolk and Newport News and with their own lines into and through the heart of Central Freight Association territory, the argument that the Gulf lines should have the same differential under the Atlantic port lines that the Atlantic port lines have under the standard all-rail lines in Central Freight Association traffic does not seem forceful."

For the past twenty years, rates which should rule on traffic moving water and rail has been a fertile source of dispute between the lines operating through the south Atlantic ports and the lines operating through Gulf ports. Many times in this period has one or the other of the group of lines in question reduced rates, in the hope of securing a greater share of the traffic, only to be met with a reduction by the others. Rate wars have been precipitated, and been adjusted by re-establishment of the old rates. These two groups of lines finally determined to submit the matter to arbitration, before Commissioner Clark.

The stated object of the Gulf port lines in seeking a differential rate which would favor them over the rates in force through the Virginia gateway, was to attract to the Gulf a more equitable proportion of the traffic from the seaboard to Colorado moving water and rail. Further, that the superior service possible over the Atlantic port routes, by reason of the shorter water haul prevented an equitable share of the traffic going via the Gulf under equal rates; that in determining what was an equitable share of the traffic, consideration must be given to the relative volume of that traffic in contrast with the total traffic from originating territory, and that the differential via the Gulf under rates via the Atlantic ports, should be sufficient to offset superior service to the extent necessary to attract to the Gulf an equitable proportion of the total tonnage. They demanded a differential rate 10 cents per 100 pounds under the rate via the Atlantic port routes, and 20 cents under the all-rail routes.

The Atlantic port lines were able to demonstrate to the satisfaction of Commissioner Clark that the Gulf lines, under equal rates, were getting all the traffic of this character to which their service and route entitled them; that it was possible to make as quick delivery over one route as over another, and that an equitable division of traffic can only be reached by placing all lines affording a similar service upon an equality of rates, aiding none and interfering with none, thereby permitting an equitable distribution of traffic to be worked out through the efforts of each of the lines.

Differentials, it was held, are not arranged for the sole purpose of a division of tonnage. This would be in violation of the Sherman law. Each line should be permitted to develop its traffic by legitimate means, without interference and without the aid of artificial adjustments.

All lines concerned in the controversy have obligated themselves to abide by this decision for one year. These are the Baltimore Steam Packet Co., the Clyde Steamship Co., Merchants & Miners Transportation Co., Ocean Steamship Co., Old Dominion Steamship Co., Southern Pacific Co., Atlantic Steamship Lines, and the Mallory Steamship Lines, together with their rail connections.

STATE COMMISSIONS.

The Illinois railway commission has rendered a decision, holding that it has authority under the act of 1911 to compel railways to establish depot and shipping facilities wherever the business demands.

The Texas Railway Commission has announced a hearing in November on a motion presented by Chairman Mayfield, providing for a rule requiring the absorption of all switching charges of $2.50 or under, regardless of local or competitive conditions, and that all switching charges in excess of $2.50 be paid by the shippers, and under no circumstances be absorbed by the carriers.

COURT NEWS.

In a decision written by Judge Sanborn and concurred in by Judges Humphrey and Baker of the United States district court, the Illinois 2-cent passenger fare law is held unconstitutional and confiscatory as applied to the Chicago, Peoria & St. Louis. The opinion upholds the report of Master in Chancery Walter M. Allen of Springfield, and the court issued a permanent injunction restraining the attorney-general from enforcing the law as to the Chicago, Peoria & St. Louis.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

E. M. Curtis, assistant general auditor of the Missouri Pacific, with headquarters at St. Louis, Mo., has resigned, effective October 1.

George N. Orcutt, general attorney of the Erie, at New York, has been appointed assistant to the president, with headquarters at New York, and H. A. Taylor, commerce counsel at New York, succeeds Mr. Orcutt.

George A. Clark, receiver of the Overton County Railroad, is now president of the re-organized company, the Tennessee, Kentucky & Northern, and Charles C. Trabue, attorney for receiver, is now vice-president and general counsel of the new company. W. H. Thompson, general freight and passenger agent, purchasing agent and auditor, of the Overton County, is now also secretary and treasurer of the new company. The general offices are at Nashville, Tenn.

Operating Officers.

J. W. Walton has resigned as assistant general manager of the Missouri, Kansas & Texas of Texas.

E. P. Goodwin has been appointed general inspector transportation of the Chesapeake & Ohio, with headquarters at Richmond, Va.

H. Adkins, superintendent of the Overton County Railroad at Livingston, Tenn., is now general superintendent and chief engineer of the re-organized company, the Tennessee, Kentucky & Northern.

Xerxes H. Cornell, who resigned recently as superintendent of transportation of the Chicago & Alton, has been appointed superintendent of transportation of the Pere Marquette, with headquarters at Detroit, Mich.

U. S. Rea has been appointed trainmaster of the Chicago, Rock Island & Pacific at Cedar Rapids, Ia., in place of B. E. Miller, who has been transferred to Des Moines, Ia., as trainmaster of the Des Moines Valley division.

J. M. Chandler, trainmaster of the St. Louis, San Francisco & Texas and Ft. Worth & Rio Grande, has been appointed superintendent of the St. Louis & San Francisco, with headquarters at Enid, Okla., succeeding G. H. Schleyer.

J. E. Johnson, trainmaster of the Chicago, Burlington & Quincy at McCook, Neb., has been appointed trainmaster, with office at Omaha, Neb., succeeding G. L. Griggs, promoted. W. P. Mettlen, general yardmaster at Omaha, has been appointed trainmaster, with office at Table Rock, Neb., and F. E. Curran succeeds Mr. Mettlen.

E. C. Keenan has been appointed general superintendent of telegraph of the Lake Shore & Michigan Southern; Michigan Central; Cleveland, Cincinnati, Chicago & St. Louis; Dunkirk, Allegheny Valley & Pittsburgh; Lake Erie & Western; Peoria & Eastern; Cincinnati Northern; Chicago, Indiana & Southern; Indiana Harbor Belt; Toledo & Ohio Central, and Zanesville & Western, with headquarters at Chicago, to succeed W. W. Ryder, resigned, to accept a position in the contract department of the Western Union Telegraph Company at New York. Effective October 1. Mr. Keenan has been heretofore superintendent of telegraph of these lines with headquarters at Cleveland, O.

The lines of the St. Louis Southwestern have been divided into two divisions, as below, and the following appointments have been made: Ft. Worth division, comprising lines, Texarkana to Ft. Worth, Sherman division, Dallas division, and Mt. Pleasant to Tyler; E. Richards, superintendent, with headquarters at Mt. Pleasant, Tex. Waco division, comprising lines, Tyler to Gatesville, including Tyler yard, Lufkin division, and Hillsboro division; H. D. Earl, superintendent, with headquarters at Tyler, Tex. Effective October 1. J. E. Callahan has been appointed assistant superintendent of the Waco division, with office at Tyler, Tex., in place of R. L. Garner, transferred, effective October 1. C. J. Lake has been appointed assistant superintendent in charge of lines south of Jonesboro, Ark., with headquarters at Pine Bluff, Ark., succeeding E. Richards, effective October 1.

Ross S. Marshall, whose appointment as superintendent of the Minneapolis & St. Louis, with headquarters at Oskaloosa, Ia., has been announced in these columns, was born March 15, 1880, at Rock Island, Ill. He was educated in the high school at Anaconda, Mont., and began railway work in November, 1898, as clerk in the superintendent's office of the Great Northern at Great Falls, Mont., remaining there until October, 1902, when he became chief clerk to F. O. Melcher, superintendent of the Illinois division of the Chicago, Rock Island & Pacific at Chicago. From September, 1905, to October, 1907, he was with the Panama Railroad at Colon, Panama, as chief clerk to W. G. Bierd and auditor, and was then until December, 1910, in the general superintendent's office of the New York, New Haven & Hartford at New Haven, Conn. On the latter date he was made assistant to the vice-president of the Minneapolis & St. Louis at Minneapolis, Minn., which position he held until his recent appointment as superintendent of that road, as above noted.

F. R. Bolles has been appointed general manager of the Copper Range, with headquarters at Houghton, Mich. He succeeds R. T. McKeever, who has been vice-president and general manager, and who will continue as vice-president. Mr. Bolles was born in Wisconsin in 1870. He received a high school education and began railway work in 1888 as a telegraph operator for the Chicago & North Western, where he remained until 1893, as telegraph operator, station cashier, relief agent, station agent and train despatcher at various points in Wisconsin and South Dakota. From 1893 to 1905 he was with the Chicago, Milwaukee & St. Paul as station agent at several important stations in Wisconsin, yardmaster, and traveling freight and passenger agent with headquarters at Milwaukee, Wis. In October, 1905, he was appointed general freight and passenger agent of the Copper Range, with office at Houghton, Mich., and on August 1, 1911, became assistant general manager and traffic manager, from which position he is now promoted to that of general manager.

F. R. Bolles.

Francis E. Barber, whose appointment as superintendent of the Cleveland division of the Wheeling & Lake Erie, with headquarters at Canton, Ohio, has been announced in these columns, was born January 29, 1870, at Smyrna, Ohio. He was educated in the common schools, and commenced his railway career in May, 1887, as brakeman on the Cleveland & Marietta, and later until February 1, 1890, was switchman for the same road. He then went with the Wheeling & Lake Erie as switchman, and at the end of five months was made conductor. From June 10, 1892, to January 1, 1893, he was night yardmaster, and again became conductor, leaving that road July 11, 1894, to go with the Cleveland, Canton & Southern, where he was employed as brakeman and conductor until October 22, of that year. He reentered the service of the Wheeling & Lake Erie as conductor, and was appointed assistant trainmaster at Pine Valley, Ohio, January 30, 1905. He was made trainmaster at Columbia, Ohio, on September 27 of the same year, and advanced to assistant superintendent at Canton, Ohio, on July 1, 1912, from which position he was recently promoted, as stated above.

Traffic Officers.

H. M. Wigney has been appointed car service agent of the Pacific Fruit Express, with headquarters at Chicago.

Roy S. Busby has been appointed traveling freight agent

of the Delaware, Lackawanna & Western, with headquarters at Newark, N. J.

S. M. Earling, assistant traffic manager of the Chicago, Milwaukee & Puget Sound, with office at Chicago, has resigned to engage in other business.

James L. Mooney has been appointed traveling freight agent of the Chicago & Alton, with headquarters at Milwaukee, Wis., succeeding Bart Riedy, promoted.

T. Y. Horton has been appointed assistant general live stock agent of the Atchison, Topeka & Santa Fe System, with headquarters at Kansas City, Mo. Effective October 1.

C. W. Marquardt, assistant general freight and passenger agent of the Copper Range, has been appointed general freight and passenger agent, with headquarters at Houghton, Mich.

F. C. Moore has been appointed general eastern freight agent of the Chicago & Alton, with headquarters at New York, N. Y., succeeding A. K. Handy, resigned to accept service with another company.

Ira Arch has been appointed freight solicitor of the Star Union Line, at Los Angeles, Cal., in place of P. E. McIntyre, resigned, effective October 1.

E. M. Ramsey has been appointed a traveling freight agent of the Southern Railway, with office at Charlotte, N. C., and F. J. Davis has been appointed a traveling freight agent, with office at Lynchburg, Va.

E. G. Tucker has been appointed commercial agent of the Macon, Dublin & Savannah, with office at Atlanta, Ga., and R. E. Phillips, commercial agent at Atlanta, has been appointed traveling freight agent, with office at Atlanta.

S. B. Douglass, traveling freight agent of the Southern Railway at Knoxville, Tenn., has been appointed commercial agent with office at Johnson City, succeeding A. W. Mays, who has been appointed traveling freight agent, with office at Knoxville, succeeding Mr. Douglass.

F. W. Gregory has been appointed general agent of the Louisiana & Arkansas, with headquarters at Shreveport, La., in place of A. G. Busch, resigned to engage in other business. D. W. Bird has been appointed traveling freight agent, with office at Little Rock, Ark., to succeed F. W. Gregory.

Engineering and Rolling Stock Officers.

C. N. Kalk has been appointed chief engineer of the Minneapolis, St. Paul & Sault Ste. Marie.

P. J. Carter has resigned as assistant engineer of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex.

Elmer H. Olson has been appointed assistant engineer of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., succeeding P. J. Carter, resigned.

T. J. Burke, supervisor of the Lehigh Valley at Towanda, Pa., has been appointed division engineer of the Auburn division, with office at Auburn, N. Y., effective October 15.

Maro Johnson has been appointed assistant engineer of bridges of the Illinois Central and the Yazoo & Mississippi Valley, with headquarters at Chicago, effective October 1.

F. C. Pickard has been appointed master mechanic of the Buffalo division of the Delaware, Lackawanna & Western, with office at East Buffalo, N. Y., succeeding F. G. Colwell, resigned.

A. M. McGill, superintendent of the Sayre, Pa., shops of the Lehigh Valley, has been appointed assistant superintendent of motive power, with office at South Bethlehem, and J. C. Seeger succeeds Mr. McGill.

J. C. Shreeve has been appointed master mechanic of the Joliet division of the Elgin, Joliet & Eastern Railway, with headquarters at Joliet, Ill., and jurisdiction over Joliet shops and points north of Joliet. Effective October 1.

Paul Hamilton, engineer, maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis at Galion, Ohio, has been appointed engineer of track and roadway, with headquarters at Cincinnati, succeeding C. S. Millard, promoted. Joseph Mullen, engineer, maintenance of way, with headquarters at Mattoon, Ill., succeeds Mr. Hamilton. W. C. Kegler, engineer, maintenance of way, with headquarters at Mt. Carmel, succeeds Mr. Mullen. C. W. Cochran, engineer, maintenance of way, with headquarters at Wabash, Ind., succeeds Mr. Kegler, and A. F. Maischaider has been appointed engineer maintenance of way, with headquarters at Wabash, Ind., succeeding Mr. Cochran.

The title of the chief mechanical officer, J. R. Gould, general superintendent of motive power of the Chesapeake & Ohio, and the Chesapeake & Ohio of Indiana, with office at Richmond, Va., has been changed to superintendent of motive power. The position of superintendent of motive power on each general division is discontinued, and C. H. Terrell, superintendent of motive power at Huntington, W. Va., has been appointed assistant superintendent of motive power, with office at Richmond, and W. P. Hobson, superintendent of motive power at Covington, Ky., has been appointed master mechanic of the Cincinnati division. H. M. Brown, master mechanic at Covington, Ky., has been appointed shop superintendent, at Huntington, W. Va.

S. J. Dillon, who has been appointed master mechanic of the West Jersey & Seashore, and the Camden Terminal division of the Pennsylvania Railroad, with headquarters at Camden, N. J., as has been announced in these columns, was born near Hollidaysburg, Pa., on April 15, 1862. He was educated in the Altoona public schools, also at Professor Davis' Business College and took a special course in mechanical drawing. On September 1, 1879, he entered the service of the Pennsylvania Railroad as a helper and messenger in the Altoona machine shops and has been in the continuous service of that company ever since. In March, 1881, he was made machinist's apprentice, becoming machinist at the Altoona machine shops in May, 1885. He was transferred to the Pennsylvania Railroad test department on April 1, 1892. In November, 1895, he was appointed assistant enginehouse foreman of the New York division at Jersey City, N. J., and was promoted to foreman of the locomotive department of the Meadows shops, New York division, on January 1, 1898. He was appointed general foreman of passenger car inspectors of the New York division, with headquarters at Jersey City, in December, 1898, and was made master mechanic of the South Amboy division on December 1, 1902. In April, 1908, he was appointed division master mechanic of the Amboy division with headquarters at Camden, and now becomes master mechanic of the West Jersey & Seashore and the Camden Terminal division, as above noted.

William Holland Winterrowd, who has been appointed mechanical engineer of the Canadian Pacific with headquarters at Montreal, Canada, as has been announced in these columns, was born on April 2, 1884, at Hope, Ind. He attended the public schools at Shelbyville, Ind., and graduated in 1907 from Purdue University. In 1905 he was employed for a short time as a blacksmith's helper on the Lake Erie & Western at Lima, Ohio, and in 1906 he was car and air-brake repairman on the Pennsylvania Lines West at Dennison, Ohio. After graduation he was appointed a special apprentice on the Lake Shore & Michigan Southern, and in 1908 was made engine house foreman of the Lake Erie, Alliance & Wheeling at Alliance, Ohio. In 1909 he became night engine house foreman of the Lake Shore & Michigan Southern at Youngstown, Ohio, and in 1910 was made roundhouse foreman of the same road at Cleveland. Later in the same year he was promoted to assistant to the mechanical engineer of the Lake Shore, and now becomes mechanical engineer of the Canadian Pacific, as above noted.

W. H. Winterrowd.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE CUBA RAILROAD is in the market for 1 locomotive.

THE PITTSBURGH STEEL COMPANY, Monessen, Pa, is in the market for 1 locomotive.

THE AMERICAN STEEL & WIRE COMPANY, Cleveland, Ohio, is in the market for 1 locomotive.

THE ERIE has purchased the experimental Pacific type locomotive No. 50,000, which was described in the *Railway Age Gazette* of December 29, 1911, page 1322, from the American Locomotive Company.

THE WASHINGTON WESTERN is in the marekt for a six-wheel switch engine weighing from 90,000 to 100,000 lbs., and having 40 to 44-in. drivers, an 8 to 10 ft. wheel base and a tractive effort of 20,000 lbs., or over.

THE GREEN BAY & WESTREN has ordered 1 mogul locomotive from the American Locomotive Company. The dimensions of the cylinders will be 19 in. x 26 in.; the diameter of the driving wheels will be 56 in., and the total weight in working order will be 136,000 lbs.

THE TENNESSEE, ALABAMA & GEORGIA has ordered 2 consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 24 in.; the diameter of the driving wheels will be 52 in., and the total weight in working order will be 139,000 lbs.

THE CHICAGO JUNCTION RAILWAY has ordered 2 consolidation locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters. The dimensions of the cylinders will be 25 in. x 32 in.; the diameter of the driving wheels will be 61 in., and the total weight in working order will be 241,000 lbs.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has ordered 10 mikado freight locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters. The dimensions of the cylinders will be 28 in. x 30 in.; the diameter of the driving wheels will be 63 in., and the total weight in working order will be 285,000 lbs.

CAR BUILDING.

THE PENNSYLVANIA RAILROAD is in the market for 5,000 freight cars.

THE GRAND TRUNK expects to issue an inquiry next week for about 100 passenger cars.

THE NORTHERN PACIFIC is in the market for 3,000 40-ton box cars and for 1,500 35-ton refrigerator cars.

THE CHICAGO & NORTHWESTERN is said to be in the market for about 2,000 box cars. This item has not been confirmed.

THE CAROLINA, CLINCHFIELD & OHIO has ordered 475 box cars and 25 stock cars from the American Car & Foundry Company.

IRON AND STEEL.

THE ST. LOUIS SOUTHWESTERN has ordered 5,000 tons of rails from the Illinois Steel Company.

THE SAN ANTONIO & ARANSAS PASS has ordered 6,000 tons of rails from the Maryland Steel Company.

THE PENNSYLVANIA RAILROAD COMPANY has placed orders for 125,000 tons of rails for next year's requirements.

THE ATLANTIC COAST LINE has ordered 20,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE CENTRAL OF NEW JERSEY has divided an order for 12,000 tons of rails between the Pennsylvania Steel Company and the Bethlehem Steel Company.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The Buffalo, Rochester & Pittsburgh has placed an order with the Western Electric Company for 125 miles of telephone train dispatching circuits on its Middle and Pittsburgh divisions.

Supply Trade News.

The Preston Car & Coach Company, Preston, Ont., has secured the Canadian manufacturing rights of some gasoline electric cars recently tried out on the Canadian Northern.

The Chesapeake & Ohio has 26 spans of released bridges for sale, running in lengths from 18 ft. 6 in. to 112 ft. Information may be obtained from the purchasing agent at Richmond, Va.

The Canadian Locomotive Company, Ltd., Kingston, Ont., which has been increasing the capacity of its plant from five to 18 locomotives per month, has orders on hand for enough locomotives to keep the plant running at full capacity for the next 12 months.

William H. Donner, who was elected president of the Cambria Steel Company, Johnstown, Pa., as announced in the *Railway Age Gazette* of September 27, was born at Columbus, Ind. His first important business engagement was as treasurer and manager of the National Tin Plate Company, of Anderson, Ind., which he organized in 1894; but he is perhaps best known as being responsible for founding the town of Monessen, Pa., which sprung up simultaneously with the organization of the National Tin Plate Company of that town. Both concerns were absorbed by the American Tin Plate Company in the latter part of 1898. Mr. Donner's next venture in the steel business was in the organization of the Union Steel Company, of Pittsburgh, Pa., which built a plant at Donora, Pa., and was responsible for the beginning of that town. The Union Steel Company consolidated with the Sharon Steel Company, of South Sharon, Pa. (now Farrell, Pa.), and was taken over by the United States Steel Corporation early in 1903. Mr. Donner will continue to live in Pittsburgh, where he has an office in the Frick building, but will spend part of his time at Johnstown.

William H. Donner.

J. Leonard Replogle, the new vice-president of the Cambria Steel Company, was born in Bedford county, Pa., May 6, 1876, and was educated in the public schools of Johnstown. He was just 13 at the time of the memorable Johnstown flood, from which he and his family barely escaped with their lives. The loss of everything made it necessary for Mr. Replogle to go to work, and he entered the employ of the Cambria Steel Company as an office boy. He served successively as clerk; shipper; assistant superintendent of the axle department; superintendent of the forge, axle and bolt departments; assistant to the assistant general manager; superintendent of the order department; assistant general manager, and assistant to president. Mr. Replogle is a director and a member of the finance committee of the Johnstown Trust Company; a director of the American Automobile Asso-

J. Leonard Replogle.

ciation; and a member of the American Electric Railway Association, the Western Railway Club, the Johnstown Country Club, the Johnstown Automobile Club and the Duquesne Club, Pittsburgh.

Morgan T. Jones & Co., inspecting and consulting engineers, Chicago, announce the appointment of P. E. Stevens as manager of the structural steel and cement departments, with headquarters in Chicago, succeeding James A. Lister. Mr. Stevens was formerly connected with the engineering department of the Great Northern and recently has been bridge engineer for the city of St. Paul, Minn.

The Commercial Acetylene Railway Light & Signal Company is the new name of the Commercial Acetylene Company, New York. This company has for a number of years manufactured an acetylene lighting system for railway cars, signal lamps and marine signals. To these products it has just added a flashlight for railway signaling. The new name better explains the activities of the company.

The Independent Pneumatic Tool Co., Chicago, has declared the regular quarterly dividend of 2½ per cent. It is reported that the business of the company for the fiscal year ending September 30 will show an increase of over 25 per cent. over the previous year, with earnings sufficient to pay the 10 per cent. yearly dividends and provide for a substantial reserve fund. Plans are now being prepared for a large addition to the factory at Aurora, Ill.

TRADE PUBLICATIONS.

Headers.—The National Machinery Company, Tiffin, Ohio, has published a small illustrated folder entitled ,"Why the National Wedge Grip Header Will Increase Your Output of Bolts, Rivets and Forgings 15 to 25 Per Cent.'

Drill.—The Ingersoll-Rand Company, New York, has devoted bulletin No. 4017 to Butterfly hand hammer drills. These drills are adapted for such work as breaking up boulders, trimming walls and all work requiring holes not over 5 ft. in depth.

Buckets.—The Brown Hoisting Machinery Company, Cleveland, Ohio, has published catalog E of Brownhoist buckets and tubs, in which the descriptions of the construction and operation of these buckets and tubs are supplemented by photographs and diagrams.

Chicago, Milwaukee & St. Paul.—The passenger department has issued an unusually attractive booklet, entitled, "The Trail of the Olympian," containing a large number of remarkably fine photographs of scenes along the route of this train over the Puget Sound extension.

Piles.—The MacArthur Concrete Pile & Foundation Company, New York, has published a new edition of its book, entitled The Pedestal Pile, giving interesting data on the bearing power of soils, frictional resistance, etc., besides a complete description of the pedestal pile.

Superheaters.—The Power Specialty Company, New York, has published an illustrated booklet on Foster superheaters, describing these superheaters in detail and discussing the value of dry steam and the advantages of superheat. A table of the properties of saturated steam is included.

Denver & Rio Grande.—The pasenger department has issued an attractive folder in the interest of the National Irrigation Congress which will meet in Salt Lake City from September 30 to October 4. The folder contains descriptions and illustrations of many of the irrigated sections of the Rocky Mountain region.

Railway in Salvador Completed.—The railway from the maritime port of La Union to San Miguel was opened to traffic on July 6, 1912. This railway connects one of the richest agricultural, stock raising and mining sections of the country with the southernmost port of the republic, and furnishes an outlet for the export products of an exceedingly productive part of Salvador.

Railway Construction.

New Incorporations, Surveys, Etc.

Anna, Blueridge & Greenville Interurban.—According to press reports this company has bought rails for the first section from Anna, Tex., east to Blueridge. The plans call for building about 32 miles east to Greenville, and it is expected that grading work will be started soon from Greenville. A. R. Nichols is the principal promoter.

Arkansas Road.—The Business Men's League of Cabot, Ark., are interested in a project to build a line from Cabot, northwest to El Paso, thence west to Conway, about 30 miles. J. H. Brawley, mayor; G. T. Murrell, J. F. See and W. M. Edwards, are interested.

Barre Railroad.—An officer writes that a contract has been given to the Douglas & Varnum-Gilfillan Company, to build an extension from the present line near Websterville, Vt., southeasterly via Stratton, Barre Medium, Empire and Libersont quarries, and the company has under consideration the question of building further extensions. The work involves handling about 6,000 cu. yds. a mile. The maximum grades will be 3 per cent., and maximum curvature 10 deg. The company expects to develop a traffic in granite, coal and quarry supplies.

Canadian Pacific.—The company will ask for bids, it is said, for work on a section of the Esquimalt & Nanaimo, between McBride Junction, B. C., and Courtenay in the Comox valley.

Denver & Rio Grande.—An officer writes that the company is now completing surveys and expects soon to arrange to let contracts for the necessary grading in connection with the change from narrow gage to standard gage, on the line between Salida, Col., and Montrose. Arrangements are also being made to replace the present narrow gage bridges with heavy steel structures, and to complete arrangements soon for track material. On account of the difficulty of carrying out work during the winter the company does not expect to actively engage in this improvement before next spring. (September 20, p. 559.)

Eastern Shore Power, Light & Railway Company.—Financial arrangements are being made, it is said, to build this line. The projected route is from Deal Island, Md., east via Princess Anne to Sinepuxent bay, about 50 miles. Bridges are to be put up at Deal Island and at Snow Hill. L. M. Milbourne, president, Kingston.

Edmonton, Dunvegan & British Columbia.—This company which was incorporated in 1907 to build from Edmonton, Alberta, in a northwesterly direction via Dunvegan to Fort George, B. C., expects to have about 120 miles of track laid during 1912. The grade on the section between Edmonton and Athabaska Landing has been finished. Track laying will be started soon, and will be continued to the Peace river. The company has a site of 142 acres for terminal purposes in Edmonton, and will use the union station to be put up by the Grand Trunk Pacific. (May 24, p. 1180.)

Elkin & Alleghany.—Track laying has been finished on about 3 miles from Thurmond, N. C., to the foot of the Blue Ridge. The plans call for building from Elkin west through Surry, Alleghany, Ashe and Watauga counties, about 150 miles. The line is already finished from Elkin to Thurmond, 12 miles. James A. Mills, president and general manager, Raleigh.

Esquimalt & Nanaimo.—See Canadian Pacific.

Georgia Railroad.—This company will lay about 3.5 miles of second track, it is said, with its own forces between Clifton, Ga., and Decatur.

Georgia Northwestern.—The plans call for building from Gainesville, Ga., northwest to Newbridge, thence west via Dawsonville and Tate to Calhoun, with a branch north to Dahlonega, about 75 miles. C. R. Arnold, Dahlonega, Ga.. J. H. Hosch and H. Palmour, Gainesville, are said to be interested.

Idaho Roads (Electric).—Plans are being made, it is said, to build an electric line from Buhl, Idaho, southwest via Castle-

ford to the Salmon river. I. D. Perrine, V. H. Taylor and E. A. Milner Buhl are interested.

ILLINOIS CENTRAL.—The report of this company for the year ended June 30, 1912, shows that during the year 94.44 miles of track were relaid with 90-lb. rail; 54.01 miles with 75-lb. rail, and 8.32 miles of track were relaid with second hand rail, replacing lighter sections. Seventy-seven new industrial tracks, aggregating 7.57 miles, and 203 new sidings, aggregating 72.94 miles were added during the year. Forty-two miles of partially ballasted tracks were reballasted. This work involved widening the embankment preparatory to placing the ballast. The company placed in operation during the year second track between Double Track Junction, Chicago, and Parkway, Ill., 3.78 miles. The new third and fourth tracks between Blue Island Junction, Ill., and Matteson, 13.1 miles, involving 26.2 miles of continuous track, were opened for operation of freight traffic in September, 1911. Of the second track between Ponchatoula, La., and Orleans Junction, 36.04 miles, the work between Ponchatoula and Frenier, 24.12 miles has been finished and placed in operation. It is expected that the remaining 11.92 miles will be completed and in operation about September, 1912. Grade crossing elimination work at Grand Crossing, Chicago, was continued during the year, and the work of reducing grades south of McComb, Miss, involving about 4 miles of double track, has been about finished. There remains a small amount of work yet to be done which will be finished about October.

KETTLE VALLEY.—This company, which is building an extension from Coldwater Junction, B. C., on the line south of Merritt, southwest to Hope on the Fraser river, about 50 miles, is said to have given a contract recently to Twohy Brothers, Merritt, B. C., for work on a section of 13 miles. (May 3, p. 1027.)

MEXICAN ROADS (Electric).—A concession has been given by the government of the state of Jalisco, Mex., to Rosalio Echeverria, of Guadalajara, to build an interurban line from Guadalajara southeast via Ocotlan and La Barca to lake Chapala, about 70 miles. It is understood that financial arrangements have been made, and that construction work will be started as soon as the surveys and other preliminary work can be completed.

MISSISSIPPI VALLEY TRACTION.—Incorporated in Illinois to build from Springfield, Ill., west through the counties of Sangamon, Menard, Cass, Schuyler, Brown and Adams to Quincy. The offices of the company are at Springfield. The directors include E. M. Skelly, W. F. Campbell, G. F. Smith, all of Springfield; J. H. Creager, Youngstown, Ohio, and E. C. Creager, Kent, Ohio.

NORTHPORT & WESTERN.—An officer writes that this company was incorporated in the states of Mississippi and Louisiana to build from Gulfport, Miss., west via Nicholson, Honey Island, La.; Wortham and Abita Springs, to Covington, La., 65 miles. W. H. Hordy, president, Gulfport, and G. McL. Lang is chief engineer, New York.

OHIO RIVER & NORTHERN.—The Ohio Public Service Commission has denied the application of this company to issue $750,000 of stock and $2,000,000 bonds. The proceeds were to be used for building a 31-mile line from Lisbon, Ohio, to a point on the Pennsylvania-Ohio state line, near Midland. The proposed line would give the Erie an entrance from Lisbon to the iron and steel district near Wheeling, and would also furnish a line in addition to that of the Pennsylvania Railroad in the East Liverpool pottery factory district. The Erie would also, by way of the Lisbon branch, have direct connection between Wheeling and Youngstown. (September 27, p. 599.)

OREGON SHORT LINE.—According to press reports a contract has been given to the Utah Construction Company for laying second track between Kemmerer, Wyo., and Fossil; also between McCammon, Idaho and Renfro. This work will be started at once. It is said that authority has also been given for the construction of eight miles of new yard tracks at Pocatello, Idaho.

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.—Track laying has been started on the line from Ayer Junction, Wash., northeast towards Spokane. An officer is quoted as saying that this work will all be finished by December 1 and that trains will be in operation into Spokane by the summer of 1913.

REID NEWFOUNDLAND COMPANY.—An officer writes that this company is building a branch from St. Johns, Newfoundland, south to Trepassey bay. Grading has been finished on 80 miles and track has been laid on 70 miles. The company is also building a branch from Broad Cove north to Hearts Content, about 35 miles. Grading has been finished on 12 miles, and track has been laid on 10 miles. The company is building its own bridges.

SCHOLTEN BROTHERS CEDAR COMPANY'S LINE.—An officer writes that this company has started work on a line from Lometa, Tex., southwest, across the Colorado river to Bend, in San Saba county, then south 8 miles to cedar forests. Track has been laid on three miles. Contracts have been given to McSwinney Bros., and to the Missouri Valley Bridge & Iron Company. The work will be difficult and involves handling about 3,000 cu. yds. a mile. The maximum grades will be 4 per cent., and the maximum curvature 20 deg. There will be a concrete bridge 300 ft. long, and about 700 lineal feet of trestles. A. Scholten, Lometa, is president, and E. Scholten is treasurer.

TEXAS UTILITIES COMPANY.—This company, it is said, is planning to build an interurban line from Dallas, Tex., north to Gainesville, thence east to Sherman, about 85 miles. The headquarters of the company are at Dallas.

UTAH LIGHT & RAILWAY COMPANY.—An officer writes that the company has under consideration plans for building from Salt Lake City, Utah, to Bountiful, about 8 miles. If the company decides to build the line the work will be carried out with the company's forces. J. S. Wells, general manager, Salt Lake City.

WAYCROSS & WESTERN.—An officer writes that this company is now operating 15 miles of the line under construction from Waycross, Ga., southwest via Sirmans and Milltown to Rays Mill, 51 miles. The company is building the line with its own forces and expects to develop a traffic in lumber, cross-ties, cotton and fertilizer. A. K. Sessoms is president, Waycross. (March 8, p. 454.)

RAILWAY STRUCTURES.

ADA, OKLA.—The St. Louis & San Francisco has had plans prepared for a concrete and steel passenger station.

BLACKFOOT, IDAHO.—The Oregon Short Line has let a contract to P. J. Moran of Salt Lake City, for the construction of a new passenger station, to cost about $27,000.

CHICAGO, ILL.—The Chicago & North Western's old Wells street passenger station, which was completed in 1880, and which has been replaced by the new terminal at Madison and Canal streets, is to be razed to make way for freight terminal improvements, for which the plans have not yet been announced.

FORT GEORGE, B. C.—Soundings have been completed for the Grand Trunk Pacific bridge over the Fraser river, near Fort George. It is understood that this structure will require a year to build. It is to be a combined railway and highway bridge.

KINGSTON, ONT.—It is understood that the Dominion government will ask for bids soon for putting up a steel bridge over Kingston harbor. Plans for a temporary bridge to replace the old structure, while a causeway is being built, are in the hands of the chief engineer.

POCATELLO, IDAHO.—The Oregon Short Line has made a contract with P. J. Moran of Salt Lake City, for a brick, concrete and steel freight house, to cost about $100,000.

ST. LOUIS, MO.—The Manufacturers' Railway has let a contract to the G. Hartmann Contracting Company for an engine house and machine shop of concrete steel construction.

TORONTO, ONT.—Bids are wanted by T. Ripley, engineer grade separation, of the Canadian Pacific on October 5, at Toronto, for the construction of the sub-structure of the Avenue Road subway at North Toronto.

See an item in General News regarding proposed union station in Toronto.

Railway Financial News.

BOSTON & PROVIDENCE.—Stockholders are to vote on October 9 on the recommendation of the board of directors that an agreement between the New York, New Haven & Hartford and the Boston & Providence be ratified. The agreement provides that the Boston & Providence shall issue $8,000,000 bonds; that the New York, New Haven & Hartford pay the interest on these bonds, establish a sinking fund which will extinguish the bonds before the termination of the lease, and guarantee payment of the bonds' principle and interest. The New Haven is to do all the work and will receive as much from the proceeds of the bonds as the cost of the work amounts to.

BROOKLYN RAPID TRANSIT.—The New York Municipal Railway Corporation has been organized by interests connected with the Brooklyn Rapid Transit, and it is planned to do the financing and probably take over the operation of the Brooklyn Rapid Transit's share of the new subways and elevated roads which have been approved by the Public Service Commission. The directors of the new company are Anthony N. Brady, J. Horace Harding, Walter G. Oakman, John T. Greier, James C. Brady and George W. Davidson of New York; T. S. Williams, Charles A. Brady, Clinton D. Burdick, John W. Weber, George D. D. Yeomans, John Englis and Arthur K. Woods of Brooklyn. Of these, four are also directors of the Brooklyn Rapid Transit.

CANADIAN PACIFIC.—Stockholders have voted to authorize an additional issue of $60,000,000 stock, making the total authorized issue $260,000,000. There are $33,766,000 first mortgage 5 per cent. bonds maturing in 1915.

CHESAPEAKE & OHIO.—The Virginia Air Line, a road running from Charlottesville, Va., to Strathmore, 30 miles, has been merged with the Chesapeake & Ohio.

CHICAGO & ALTON.—Judge Lovett, chairman of the board of the Harriman Lines; Julius Kruttschnitt, director of maintenance and operation of the Harriman Lines, and L. J. Spence, director of traffic of the Harriman Lines, have been elected directors of the Chicago & Alton, succeeding Theodore P. Shonts, H. P. Huntington and F. P. Frazier.

CINCINNATI, HAMILTON & DAYTON.—The fixed interest at the rate of 1 per cent. only is to be paid on November 1 on the general mortgage bonds of 1909-1939. These bonds will bear 1 per cent. fixed interest for three years ending June 30, 1914, and, in addition, 3½ per cent. dependent upon income. The bonds bore no fixed interest during the year ended June 30, 1911, but will bear fixed interest at 3 per cent., with 1½ per cent. dependent on income from 1914 to 1916. After 1916 the full 4½ per cent. interest is fixed.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Stockholders are to vote on November 25 on the question of authorizing an extension from Terre Haute, Ind., to the Indiana-Illinois state line, following the route of the Cairo, Vincennes & Chicago; on the question of buying the franchises of the Cairo, Vincennes & Chicago; on the question of buying the property of the Cincinnati & Springfield, the Columbus, Springfield & Cincinnati, the Findlay Belt Railway, the Harrison Branch Railroad and the Chicago, Indianapolis & St. Louis Short Line; and on the question of making a mortgage on these properties and placing this mortgage and stock of the companies, etc., under the C. C. C. & St. L.'s general mortgage.

COLORADO & SOUTHERN.—John J. Mitchell and Hale Holden, of Chicago, have been elected directors of the Colorado & Southern, succeeding Frank Trumbull, resigned, and Edwin Hawley, deceased.

DULUTH, SOUTH SHORE & ATLANTIC.—F. W. Stevenson has been elected a director, succeeding Allen Cameron.

IOWA CENTRAL.—See Minneapolis & St. Louis.

IOWA CENTRAL & WESTERN.—See Minneapolis & St. Louis.

LEHIGH VALLEY RAILWAY.—See Lehigh Valley Sales Company.

LEHIGH VALLEY SALES COMPANY.—This company, which was incorporated in January as a sales company for the Lehigh Valley Coal Company, a subsidiary of the Lehigh Valley Railway, has declared an initial dividend of 2½ per cent. on its $6,560,000 stock outstanding.

MINNEAPOLIS & ST. LOUIS.—This company has bought all of the Iowa Central & Western Railway stock. The I. C. & W. has been operated under a lease of 1901-1951 by the Iowa Central at a rental of 20 per cent. of gross earnings. Hereafter the Minneapolis & St. Louis will operate the property.

NATIONAL RAILWAYS OF MEXICO.—Charles H. Sabin, of the Guaranty Trust Company, New York; Paul M. Warburg, of Kuhn, Loeb & Company, New York; H. H. Wehrhane, of Hallgarten & Company, New York; Enrique Martinez Sobral, of New York, and Andre Guieu, Elias S. A. de Lima, Alberto J. Parmi and Ernesto Pugibet, of Mexico City, have been elected directors, succeeding Bradley M. Palmer, Clay Arthur Pierce, Henry S. Priest and Eben Richards, of New York; and Ignacio L. de la Barra, Hugo Scherer, Jose A Signoret and Gabriel Mancera, of Mexico City, resigned.

NEW YORK MUNICIPAL RAILWAY CORPORATION.—See Brooklyn Rapid Transit.

NEW YORK, NEW HAVEN & HARTFORD.—See Boston & Providence.

OVERTON COUNTY RAILROAD.—See Tennessee, Kentucky & Northern.

SEABOARD AIR LINE.—William J. Harahan, whose election as president was announced in our issue of last week, has been elected a director, succeeding W. B. Donham, resigned.

TENNESSEE, KENTUCKY & NORTHERN.—This is the name of the new company which has been organized to take over the property of the Overton County Railroad, which has been sold under foreclosure. The road runs from Algood, Tenn., to Livingston, 19 miles.

TONOPAH & GOLDFIELD.—A dividend of 7 per cent. has been declared on the $500,000 preferred stock and a dividend of 3 per cent. has been declared on the $1,650,000 common stock, payable October 3. In 1906 27 per cent. dividends were paid, and in 1907 both the preferred and common stock paid 10 per cent. dividends. Since then no dividends have been paid.

VIRGINIA AIR LINE.—See Chesapeake & Ohio.

RAILWAY CONSTRUCTION IN MADAGASCAR.—In 1908 freight carried by rail from Tananarivo to the coast amounted to only 4,700 tons; in 1911 the total was 34,000 tons. Encouraged by this record, the government has now decided to build a further line 99 miles long from Tananarivo to Antsirabe, passing through a densely populated and a rich territory.

PROPOSED ARGENTINE BRANCH LINES.—The minister of public works of the Argentine Republic has asked for an issue of bonds to the amount of about $9,600,000 for the construction of two branch lines of the Provincial Railway of La Plata to the fifth meridian. One of these branches will run from Saladillo to General La Madrid with a spur to Olavarria. The other line will run from a point between Trenque Lauquen and Carlos Tejedor to the fifth meridian. The two branches will have an approximate length of 240 miles in the province of Buenos Aires.

INTERNATIONAL RAILWAYS OF CENTRAL AMERICA.—In order to push forward the work of the projected Pan American Railway, the Guatemalan Railway and certain railway companies in Salvador have consolidated into a single company under the name of International Railways of Central America. This company has obtained from the governments of Guatemala and Salvador the concessions necessary for the construction and operation of the portion of the Pan American Railway which will run through those countries, and will now proceed to connect into a continuous line the Mexican, Guatemalan and Salvadorean railways, forming a part of the Pan American system. The Pan American Railway in Mexico has been built to Mariscal on the Guatemalan frontier, and the Guatemalan link of the same railway extends to Las Cruces, a distance of 42 miles from Mariscal. The construction work which will complete the gap between the two divisions is well under way.

ANNUAL REPORTS

ILLINOIS CENTRAL RAILROAD COMPANY—SIXTY-SECOND ANNUAL REPORT.

REPORT OF THE BOARD OF DIRECTORS.

To the Stockholders of the Illinois Central Railroad Company:

The following report of the operations and affairs of your Company for the year ended June 30, 1912, is respectfully submitted by the Board of Directors.

The number of miles of road operated on June 30, 1911, was..... 4,576.09
On May 5, 1911, the Indianapolis Southern Railroad was purchased at a foreclosure sale and since July 1, 1911, its railroad has been operated as part of the Indiana Division of the railroad of your Company 176.94
There was added on July 1, 1911, the Bloomington Southern Railroad mileage formerly operated by the Indianapolis Southern Railroad Company 2.16
There was added on July 1, 1911, the mileage of the Omaha Bridge & Terminal Railway, which was acquired under lease..... 2.03
Mileage added account of additional trackage rights, revision of line and re-measurements 5.48
The number of miles of railroad operated on June 30, 1912, was.. 4,762.70
The average number of miles operated during the year was..... 4,762.70

INCOME.

The following is the Income Account for the year; and for purposes of comparison the Company's Income Account for the preceding year has been re-stated so as to include the income of the Indianapolis Southern Railroad Company and the Omaha Bridge & Terminal Railway Company.

	1912.	1911.	Increase + Decrease —
Average miles operated during year	4,762.70	4,749.64	+ 13.06
Operating revenues:			
Freight	$37,881,765.94	$41,503,985.23	—$3,622,219.29
Bridge tolls and miscellaneous freight	2,798,905.54	3,132,190.02	— 333,284.48
Passenger	13,337,562.40	13,168,862.89	+ 168,699.51
Bridge tolls and miscellaneous passenger	264,728.59	263,226.04	+ 1,502.55
Mail	962,848.30	951,591.37	+ 11,256.93
Express	1,851,584.23	1,542,381.75	+ 309,202.48
Other passenger train.....	418,748.17	428,692.55	— 9,944.38
Other transportation	769,023.37	678,260.10	+ 90,763.27
Revenue from operations other than transportation	442,105.63	419,546.57	+ 22,559.06
Total operating revenues	58,727,272.17	62,088,736.52	— 3,361,464.35
Operating expenses:			
Maintenance of way and structures	7,691,214.55	7,750,524.54	— 59,309.99
Maintenance of equipment.	13,857,548.66	12,495,332,86	+ 1,362,215.80
Traffic expenses	1,400,941.84	1,364,141.41	+ 36,800.43
Transportation expenses...	23,653,249.18	21,778,530.58	+ 1,874,718.60
General expenses	1,518,512.31	1,369,327.31	+ 149,185.00
Total operating expenses	48,121,466.54	44,757,856.70	+ 3,363,609.84
Net operating revenue..	10,605,805.63	17,330,879.82	— 6,725,074.19
Outside operations:			
Revenues	493,378.32	471,491.13	+ 21,887.19
Expenses	600,735.22	527,955.37	+ 72,779.85
Net deficit from outside operations	107,356.90	56,464.24	+ 50,892.66
Total net revenue.....	10,498,448.73	17,274,415.58	— 6,775,966.85
Taxes accrued	2,685,730.13	2,720,849.02	— 35,118.89
Operating income	7,812,718.60	14,553,566.56	— 6,740,847.96
Other income	5,403,584.66	6,714,704.88	— 1,311,120.22
Gross corporate income...	13,216,303.26	21,268,271.44	— 8,051,968.18
Deductions from gross corporate income	9,749,855.39	9,952,927.52	— 203,072.13
Net corporate income.....	3,466,447.87	11,315,343.92	— 7,848,896.05
Disposition of net corporate income:			
Dividends on capital stock.	.....	7,650,720.00	— 7,650,720.00
Appropriated for additions and betterments	61,481.44	164,847.23	— 103,365.79
Balance transferred to credit of profit and loss.....	3,404,966.43	3,499,776.69	— 94,810.26

REVENUE.

The business during the year shows a material decrease as compared with the previous year, the latter being the largest in the history of your Company. The principal reasons for the decrease were a strike of the shopmen which began on September 30, 1911, on all of the different lines of your Company and continued as a disturbing factor for several months; an unusually severe winter which seriously affected the movement of traffic on the Northern Lines; and the floods in the spring on the Southern Lines, which not only interrupted traffic but caused a large increase in operating expenses.

The total operating revenues for the current year were $58,727,272.17 which, compared with $62,088,736.52 of the preceding year, shows a decrease of $3,361,464.35, or 5.41 per cent.

Freight transportation revenue decreased $3,622,219.29 or 8.73 per cent. The tons of revenue freight carried decreased from 27,966,035 tons to 26,339,149 tons. Table No. 13 shows the principal commodities transported, as well as a comparison of such commodities with the previous year.

Revenue from the transportation of passengers increased from $13,168,862.89 to $13,337,562.40, or 1.28 per cent. There was an increase in passenger traffic on the Northern and Southern Lines while the Western Lines show a slight decrease.

Table No. 12 shows the general details of the freight and passenger traffic.

EXPENSES.

The operating expenses for the year were $48,121,466.54 compared with $44,757,856.70 for the preceding year, an increase of $3,363,609.84, or 7.52 per cent.

MAINTENANCE OF WAY AND STRUCTURES.

The expenditures for maintenance of way and structures were $7,691,214.55, a decrease of $59,309.99, or .77 per cent. compared with the previous year.

The increases in wages from time to time granted various classes of employes in the maintenance of way department referred to in the report for the preceding year were continued throughout the full current fiscal year.

Some of the important renewals made, the entire cost of which was charged to operating expenses, are as follows:

The total number of cross ties renewed was 1,800,577 which is equivalent to 568.36 miles of continuous track and is 8 per cent. of all ties in track, including sidings.

8.12 miles of track were relaid with new steel rail replacing rail of the same weight.

There were 3,755 lineal feet of timber and pile bridges rebuilt or replaced by embankments.

There were 938 lineal feet of iron pipe and 3,109 lineal feet of concrete pipe culverts put in.

697 miles of ballasted track were repaired or renewed to restore to original standard.

On page 10 of this report, under the head of "Physical Charges," will be found information concerning work charged wholly to "Additions and Betterments" as well as work involving both "Renewals" and "Additions and Betterments."

MAINTENANCE OF EQUIPMENT.

Maintenance of equipment expenses increased $1,362,215.80, or 10.90 per cent.

Charges for depreciation of equipment amounted to $1,576,957.82, compared with $1,603,128.29 for the previous year, a decrease of $26,170.47.

The principal item of increase as shown by Table No. 10 is in the account "Other Expenses." To this account was charged the entire cost of securing new shop employes to take the place of those leaving the service in September, 1911, and also the expense of commissaries and all the various other miscellaneous expenses in connection with the strike of the shopmen referred to under the head of "Revenue" and in "General Remarks."

The average mileage per serviceable locomotive for the year was 30,679.

The average age of locomotives was 13.98 years compared with 14.24 years for the preceding year; of revenue freight cars 9.86 years compared with 9.17 years last year; of passenger train cars 19.1 years compared with 19.2 years the preceding year.

TRAFFIC EXPENSES.

Traffic expenses increased $36,800.43 or 2.70 per cent.

New commercial agencies were established at Houston, Texas, and Buffalo, N. Y.

A traveling freight and passenger agent was appointed with headquarters at San Antonio, Texas, and a traveling freight agent with headquarters at Little Rock, Ark.

An agriculturist was added to the Industrial and Immigration Department in the South to supervise the work on the experimental farms.

TRANSPORTATION EXPENSES.

Transportation expenses increased $1,874,718.60, or 8.61 per cent.

The current fiscal year includes a full year's proportion of the increases in the pay of various classes of employes in the transportation department from time to time granted in the preceding year. In addition to this substantial increase, there was a large amount of overtime due to the severity of the winter and delays occasioned by the floods in the spring months.

GENERAL EXPENSES.

General expenses increased $149,185.00, or 10.89 per cent.

TAXES.

There was a decrease of $35,118.89 or 1.29 per cent. in taxes.

Owing to the decrease in gross revenue and income, there was a substantial decrease in the Federal Excise Tax and in the Charter Tax in Illinois; but there were large increases in taxes in the States of Tennessee and Iowa, and in the State of Illinois on properties other than the Charter Line, as well as lesser increases in the States of Indiana, Wisconsin, South Dakota, Louisiana and Alabama.

FINANCIAL.

The general balance sheet Table No. 4 shows the financial condition of the Company at the close of the fiscal year compared with the previous fiscal year.

CAPITAL STOCK AND FUNDED DEBT.

There was no change in the capital stock during the year.

In accordance with Section Two of Article Two of the Refunding Mortgage, the Company issued during the month of July, 1911, $1,800,000.00 of bonds, being the balance of the $10,000,000.00 of bonds authorized to be issued; and the bonds so issued were sold.

$2,000,000.00 of the First Lien Equipment Fours were delivered to the Trustee and cancelled in accordance with the provisions of the indenture; and the Company also delivered to the Trustee $1,515,000.00 additional bonds in connection with the sale to the Central Fruit Despatch of 2,671 refrigerator cars which were mortgaged under the First Lien Equipment Mortgage.

SECURITIES OWNED.

$2,000,000.00 par value of capital stock and $10,000,000.00 First Mortgage Gold Fives of the Indianapolis Southern Railroad Company have been cancelled and the book value of the securities transferred to the "Property Investment" account, the railroad of that Company having been sold under foreclosure and purchased by this Company.

The Company has purchased $1,500,000.00 par value of the capital stock of the Central Fruit Despatch, a company organized in January, 1912, under the law of the State of Illinois.

Of the $156,500.00 Peoria & Pekin Union Railway Company Five Per Cent. Debenture Bonds owned, $12,500.00 matured August 1, 1911, and were redeemed. In November, 1911, $100,000.00 of Peoria & Pekin Union Railway Company Five Per Cent. Debenture Bonds were purchased.

$339,763.21 of bonds and scrip of The Yazoo & Mississippi Valley Railroad Company Gold Improvement Fours of 1934 were received in payment for amounts advanced by your Company for construction.

The Company purchased $3,823,000.00 First Preference, $6,844,000.00 Second Preference and $3,794,000.00 Third Preference Income Bonds of the Central of Georgia Railway Company.

INSURANCE AND OTHER FUNDS.

The Insurance Fund was augmented during the year by charges to operating expenses; and other changes have been made as follows:

	Year Ending June 30, 1912.	Year Ending June 30, 1911.
Amount at credit of fund July 1st	$2,067,701.58	$2,036,464.51
Added through monthly charges to operating expenses	60,000.00	60,000.00
Collected from lessees account of insurance	4,059.37	5,189.02
Interest received on investments of the fund	83,100.00	81,320.00
Fire losses collected	23,198.63	309.02
	$2,238,059.58	$2,183,282.55
Losses by fire	$ 107,102.41	$ 80,486.04
Premiums paid for reinsurance	44,697.78	35,094.93
	$ 151,800.19	$ 115,580.97
Amount at credit of fund June 30th	$2,086,259.39	$2,067,701.58

The trustees of the various sinking funds have reported holdings as of June 30, 1912, as follows:

Cairo Bridge Contingent Fund, $504,180.00.

Cairo Bridge Sinking Fund, $251,666.36, an increase of $28,659.25.

Sinking Fund for Western Lines Bonds, $1,129,480.67, an increase of $88,949.91.

Sinking Fund for Omaha Division Bonds, $143,841.44, an increase of $15,196.97.

The additions during the year to the several sinking funds amounted to $132,806.13.

ADDITIONS AND BETTERMENTS.

There was expeuded during the year for Additions and Betterments (including improvements on subsidiary properties) $6,840,015.01. The following is a classified statement of these expenditures:

	Additions and Betterments paid for from Proceeds of General Refunding Mortgage Bonds.	Additions and Betterments Appropriated out of Year's Income.	Additions and Betterments Represented by Advances to Subsidiary Lines.
Right of way and station grounds	$113,879.49	$19,400.35	$185,213.27
Real estate	616,665.25	.....	20,012.60
Widening cuts and fills	.....	.....	37,392.96
Protection of banks and drainage	.....	.....	Cr. 2,829.60
Grade reductions and changes of line	.....	.....	82,730.12
Bridges, trestles and culverts	207,779.74	9,385.21	271,596.69
Increased weight of rail	67,513.48	9,181.76	59,840.54
Improved frogs and switches	7,357.66	260.00	.....
Track fastenings and appurtenances	50,161.65	3,883.76	49,825.52
Ballast	.....	.....	44,345.20
Additional main tracks	719,316.22	5,301.61	239,005.71
Sidings and spur tracks	157,377.30	8,680.40	108,881.19
Fencing right of way	1,278.21	.....	97.67
Improvement of crossings under or over grade	25,701.34	.....	8,741.91
Elimination of grade crossings	169,443.29	.....	5,388.78
Interlocking apparatus	16,193.49	2,292.68	41,550.96
Block and other signal apparatus	102,523.28	.....	87,764.01
Telegraph and telephone lines	15,049.54	.....	Cr. 44,949.63
Station buildings and fixtures	73,327.53	35,123.60	141,753.96
Shops, enginehouses and turntables	604,630.83	.....	80,693.53
Shop machinery and tools	42,942.92	.....	24,674.15
Water and fuel stations	56,660.33	.....	77,234.18
Grain elevators and storage warehouses	.....	.....	21,926.02
Dock and wharf property	.....	.....	105.26
Electric light and power plants	.....	.....	28,255.40
Terminal yards	386,220.95	.....	3,267.73
EQUIPMENT:			
Steam locomotives	2,582,304.78	.....	.....
Passenger train cars	679,523.33	.....	.....
Freight train cars	Cr.1,513,789.84	.....	.....
Work equipment	14,700.00	Cr. 29,627.93	.....
Floating equipment	2,000.00	Cr. 2,400.00	.....
Other additions and betterments	5,789.09	.....	1,465.58
	$5,204,549.86	$61,481.44	$1,573,983.71

The following shows the amount advanced during the year to each of the Subsidiary lines, these amounts being included in total advances shown in Table No. 6 of this report:

Chicago, St. Louis & New Orleans R. R.	$1,192,893.69
Canton, Aberdeen & Nashville R. R.	12,175.37
South Chicago R. R.	3,630.80
Blue Island R. R.	316.30
Dubuque & Sioux City R. R.	285,102.39
Kensington & Eastern R. R.	37,758.89
Mississippi & Alabama R. R.	Cr. 23,443.71
Alabama Western R. R.	Cr. 56,862.61
Omaha Bridge & Terminal Ry.	2,333.81
Batesville Southwestern R. R.	52,867.90
Bloomington Southern R. R.	67,572.83
Jackson & Southeastern R. R.	Cr. 361.95
	$1,573,983.71

PHYSICAL CHANGES.

During the year, the physical condition of the Company's road and equipment was greatly improved. The following are the principal physical improvements, the cost of which was wholly or partially charged to "Additions and Betterments":

ROADWAY AND STRUCTURES:

There were 94.44 miles of track relaid with 90 lb. new steel rail; 54.01 miles with 75 lb. new steel rail; making a total of 148.45 miles of track relaid with new steel rail. 8.32 miles of track were relaid with second hand rail, replacing rail of lighter pattern. The total mileage of track relaid with new and second hand steel rail was 156.77.

Seventy-seven new industrial tracks were added, aggregating 7.57 miles in length, after deducting industrial tracks which were taken up.

Two hundred and three new Company sidings were added, aggregating 72.94 miles in length, after deducting the tracks taken up and those converted into second main tracks.

Forty-two miles of partially ballasted tracks were reballasted with washed gravel, a like mileage of embankment being widened, preparatory to placing the ballast.

Second main track was completed and opened for operation on November 2nd, 1911, between Double Track Junction, Chicago, and Parkway, Ill., a distance of 3.78 miles.

The new third and fourth main tracks between Blue Island Junction and Matteson, Ill., a distance of 13.1 miles, involving 26.2 miles of continuous track, mentioned in the previous year's report, were opened for operation of freight traffic on December 17th, 1911.

Of the second main track between Ponchatoula and Orleans Junction, La., a distance of 36.04 miles mentioned in last year's report, the work between Ponchatoula and Frenier, a distance of 24.12 miles, has been completed and placed in operation. It is expected that the remaining 11.92 miles will be completed and in operation about September 1st, 1912.

The plant of the West Pullman Car Works was secured at a cost of $238,882.00 in part settlement of indebtedness, and various other parcels of real estate were purchased at points along the line of road at an aggregate cost of $377,783.25.

The grade crossing elimination work at Grand Crossing, Chicago, continued during the year and there was expended on this account $169,340.69.

The work of reducing grades south of McComb, Miss., involving approximately four miles of double track has been practically completed and track was turned over for traffic on February 1st, 1912. The small portion of the work remaining undone will be completed about October 15th, 1912.

During the year, there were installed and placed in operation 26.40 miles of electric automatic block signals between Blue Island Junction and Matteson, Ill., 5.72 miles between Bosky Dell and Carbondale, Ill., 14.60 miles between Dubuque and Peosta, Iowa, 25.39 miles between LeMars and Sioux City, Iowa, and 24.52 miles between Hanson City and New Orleans, La., a total of 96.63 miles of electric automatic block signals. This, with the trackage previously equipped, makes a total of 682.59 miles protected by block signals as of June 30th, 1912.

The Company has in process of installation .84 miles of electric block signals at the Champaign, Ill., Yard; 4.76 miles at the Mattoon, Ill., Yard; 53.24 miles between Kankakee and Gilman, Ill.; 24.00 miles between Indiana Ave., Chicago, and Parkway, Ill.; 16.53 miles between Scales Mound and Portage, Ill.; and 11.62 miles between Asylum and Nogan, Miss.; a total of 110.99 miles of electric block signals now under way.

New passenger stations were erected at Flossmoor, Ill., Metropolis, Ill., Ft. Dodge, Iowa, and Hammond, La. Passenger stations were enlarged at Effingham, Ill., and Holly Springs, Miss., and the passenger concourse at Central Station, Chicago, was widened and canopy erected.

New freight houses were erected at Mattoon, Ill., and Hammond, La.

Combination stations were enlarged or improved at Divernon, Ill.; Alta, Iowa; Grayson Springs, Leitchfield, Marion and Sturgis, Ky.; Red Bay and Vina, Ala.; and Oxford, Way, Lamar and McComb, Miss.

New mechanical coaling plants were erected at Carbondale, Centralia, Minonk and Champaign, Ill., and at Ft. Dodge, Iowa.

A filter plant was installed at Carbondale, Ill.; and at West End, Ill., the reservoir was enlarged. At Hart, Ill., a new 100,000 gallon tank was erected replacing a worn out tank of 40,000 gallons capacity. An additional well was put down at Lena, Ill., and a new pumping plant, pipe lines, etc., were installed at Fort Dodge, Iowa. At Fulton, Ky., water facilities were installed; and at Bardwell, Ky., an additional well was put down. There were installed at McComb, Miss., a new pumping station, pipe lines, and reservoir; at Brookhaven, Miss., a new pipe line, pumping plant and tank at Bogue Chitto River; and at Crystal Springs, Miss., a new pumping plant, including pipe line, the dam of reservoir at Chatauqua Lake being raised, these facilities replacing wells from which an adequate supply of suitable water could not be obtained.

A new mechanical plant, including machine shop, with adequate machinery, store room, new round house, cinder pits, coaling station, etc., was erected at Champaign, Ill. At Fort Dodge, Iowa, a new engine house, turntable, fuel station and oil house were installed. At Louisville, Ky., a new cinder pit, pen stock and locomotive crane were put in. The mechanical facilities were also improved at 27th Street, Chicago, Burnside, Ill., Clinton, Ill., Freeport, Ill., and Fulton, Ky.

New eighty-five foot turntables replacing sixty-six foot tables were installed at 27th Street, Chicago, Centralia, Ill., and Mounds, Ill. A new seventy-five foot turntable replacing a sixty-six foot table was put in at Government Yard, New Orleans, and a new sixty-six foot table, replacing a sixty foot table was installed at Rockford, Ill.

1,589 lineal feet of steel and concrete bridges were constructed, replacing timber and pile bridges, trestles and embankments.

1,485 lineal feet of steel and masonry bridges were rebuilt or replaced by embankments.

19,771 lineal feet of timber and pile bridges and trestles were rebuilt or replaced by embankment.

EQUIPMENT:

One hundred and twenty-seven locomotives were added during the year and ten were sold or destroyed, an increase of one hundred and seventeen locomotives with an increase of 2819 tons in tractive efficiency.

Forty-five passenger train cars were added during the year and seven cars were vacated or transferred to other service, an increase of thirty-eight cars.

Six hundred freight train cars were added during the year and 3850 were sold, destroyed or transferred to work service, a decrease of 3250 cars. The cars retired from freight service were old and of light capacity. The aveage capacity of cars owned at the close of the year was 39.57 tons compared with 38.86 tons for last year, and the total capacity of cars was 2,180,635 tons compared with 2,266,675 tons for last year.

GENERAL REMARKS.

Commencing July 1st, 1911, the Indianapolis Southern Railroad, which was purchased under foreclosure as stated in the report for the last fiscal year, has been operated as part of the Indiana Division of the Railroad of your Company. In order that comparisons may be made, the income account and statistics in the first part of the report, and all data shown on the tables following, have been revised so that the information relating to the previous years includes the operations of the Indianapolis Southern Railroad, as well as the Illinois Central Railroad.

For many years past, your Company had contracts with various classes of employes in its mechanical department, and on June 21st, 1911, word was received from a so-called "Illinois Central and Allied Lines Federation," for a conference, submitting a proposed agreement. The demands made were of such a nature that it was felt the Company could not submit to them and continue to perform the public functions for which it was created. An appeal was made to the employes to render the same respect to existing contracts that they would expect of the Company; but the radical element outnumbered the conservatives, and this resulted in a strike of more than 10,000 employes on September 30th, 1911, which for

several months caused great inconvenience to your patrons, and increased expense in maintaining and operating your property.

Along with other railroad companies in the territory traversed by your Northern Lines, the severe winter caused serious loss to your Company. The extreme weather accompanied by heavy snows was, from an operating standpoint, the worst known for many years.

In the spring months, a flood occurred in the southern territory, and for a considerable part of the month of April, the double track line in the south, including the Cairo Bridge, was out of commission. During this period, the passenger trains of your Company, to and from the south, and what small proportion of the freight which could be handled, were detoured over the single track line between Mattoon, Ill., and Fulton, Ky., via Evansville and Princeton.

The several unlooked for occurrences above named, coming one after the other, so affected the operating results of your Company, that the month of June, 1912, is the first since August, 1911, which shows an increase in net revenue over the preceding fiscal year.

There were carried on the rolls under the Pension System, 393 employes to whom payments aggregating $95,539.76 were made during the fiscal year.

The Board takes renewed pleasure in acknowledging the fidelity, efficiency and united effort displayed by the officers and loyal employes in the discharge of their duties during the past year, especially under the trying conditions which have obtained..

By order of the Board of Directors.

C. H. MARKHAM,
President.

ST. LOUIS SOUTHWESTERN RAILWAY CO.—TWENTY-FIRST ANNUAL REPORT.

"COTTON BELT ROUTE."

OFFICE OF
CHAIRMAN OF THE BOARD OF DIRECTORS.

NEW YORK, September 16, 1912.

To the Stockholders of the
St. Louis Southwestern Railway Company:

The Twenty-first Annual Report of your Company, for the fiscal year ended June 30, 1912, is herewith presented.

At a special meeting of Stockholders held on April 17, 1912, the by-laws of your Company were amended, and the office of Chairman of the Board of Directors created. The Directors, at a meeting held April 22, 1912, elected the undersigned Chairman of the Board, and Mr. F. H. Britton, President and General Manager.

Detailed exhibits showing the operating results for the year and the financial and physical condition of your property at the close of the year, will be found in the accompanying report of the President and General Manager.

FIRST TERMINAL AND UNIFYING MORTGAGE.

In pursuance of resolutions of the Board of Directors and a vote of the Stockholders, your Directors authorized, during the current fiscal year, the execution, by your Company, of a mortgage to the Guaranty Trust Company of New York and Walker Hill, Trustees, to be known as the "First Terminal and Unifying Mortgage," to secure an authorized issue of $100,000,000.00, five per cent. First Terminal and Unifying Mortgage Bonds, dated January 1, 1912, and maturing January 1, 1952, interest payable semi-annually on the first days of January and July during the life of the mortgage.

In connection with this mortgage, and to comply with the requirements of the Missouri statutes, the par value of the authorized capital stock of your Company was increased from $55,000,000.00 to $130,000,000.00 by action of the Stockholders, the increase of $75,000,000.00 par value consisting of 750,000 shares of common stock of the par value of $100.00 each. No portion of this authorized increase has been issued—the amount of capital stock outstanding remaining the same as at the close of the preceding fiscal year.

A sale of $7,500,000.00 face amount of First Terminal and Unifying Bonds has been made for the following purposes, to-wit:

$2,250,000.00	to acquire new terminal properties in St. Louis, Mo., and Ft. Worth, Texas.
2,165,000.00	to retire outstanding Equipment Trust Obligations of an equal face value.
400,000.00	to acquire First Refunding and Extension Mortgage Bonds of Gray's Point Terminal Railway Co. of an equal face value.
2,685,000.00	to reimburse the Company's treasury for expenditures and advances for permanent additions and betterments heretofore made and chargeable to property investments.

Of this $7,500,000.00, there were issued, to June 30, 1912, bonds aggregating the sum of $7,071,000.00, as shown in the paragraph following, headed "Funded Debt." The balance of these bonds, amounting to $429,000.00, are reserved to retire that portion of Equipmment Trust Obligations, Series "B," still outstanding.

This acquisition and retirement of equipment trust obligations will materially reduce your Company's annual cash requirements; and the provisions in the mortgage for further issues of bonds from time to time, as may be deemed advisable, places your Company on a sound financial basis.

FUNDED DEBT.

The net increase in the amount of funded debt outstanding at the close of the current fiscal year, over the preceding fiscal year, as shown by the General Balance Sheet, viz.: $5,123,842.66, is explained as follows:

First Terminal and Unifying Mortgage Bonds—		
Issued for re-imbursement of expenditures and advances heretofore made for Additions and Betterments		$2,685,000.00
Issued to acquire real estate in the City of St. Louis, Mo., and to construct terminal facilities thereon		2,000,000.00
Issued to acquire real estate in the City of Ft. Worth, Texas, and to construct terminal facilities thereon		250,000.00
Issued to acquire $400.000.00 face amount of First Refunding and Extension Mortgage Bonds of the Gray's Point Terminal Ry. Co		400,000.00
Issued to retire Equipment Trust Obligations of your Company outstanding January 1, 1912, viz.:		
Series No.	Amount.	
C-21	$139,619.40	
C-22	76,731.84	
H-1	276,495.00	
B (in part)	1,244,000.00	
Total	$1,736,846.24	
Amount of bonds issued to acquire the foregoing notes		1,736,000.00
Total		$7,071,000.00
Deduct:		
Equipment Trust Obligations paid and canceled		1,947,157.34
Net increase, this year		$5,123,842.66

DIVIDENDS ON PREFERRED STOCK.

Two semi-annual dividends on the $20,000,000.00 outstanding preferred capital stock were declared by the Board during the fiscal year, viz.: 2% payable January 15, 1912, and 2½% payable July 15, 1912.

The Board acknowledges with pleasure its appreciation of the loyal and faithful services of the officers and employes of your Company during the past year.

For the Directors,

EDWIN GOULD,
Chairman.

"COTTON BELT ROUTE."

ST. LOUIS SOUTHWESTERN RAILWAY CO.

OFFICE OF THE PRESIDENT AND GENERAL MANAGER.

ST. LOUIS, Mo., September 3, 1912.

MR. EDWIN GOULD,
Chairman of the Board of Directors:

DEAR SIR—I submit herewith the Annual Report of the operations of the company for the fiscal year ended June 30, 1912.

During the year the average main track mileage operated was 1,548.2, an increase of 61.2 miles over the preceding year. The main track mileage operated at the close of the fiscal year, June 30, 1912, was 1,609.2 miles, an increase of 109.2 miles over the main track mileage as of June 30, 1911, which is explained as follows:

Trackage rights—	
Over C. R. I. & P. Ry. between Brinkley, Ark. and Bridge Junction, Ark. (West Memphis)	64.7
Over Kansas City and Memphis Railway and Bridge Co. tracks (Memphis Bridge)	2.5
Over St. L. & S. F. R. R. (in Memphis)	.4
Over Memphis Union Station Co. tracks (in Memphis)	.5
Over St. L. I. M. & S. Ry. (in Pine Bluff, Ark.)	1.2
Over Vandalia R. R. (in East St. Louis, Ill.)	1.7
Connecting track with C. R. I. & P. Ry. (in Brinkley, Ark.)	.8
Connecting track with St. L. I. M. & S. Ry. (in Pine Bluff, Ark.)	.4
Central Arkansas and Eastern R. R. (operated under lease)	43.9
Changes in line, due to re-chainage, etc	.4
	116.5
Less—Terminal R. R. Assn. of St. Louis mileage discontinued by this company on account of running its passenger trains via East St. Louis, Ill. and Eads Bridge instead of via Merchants Bridge	7.3
Net increase, this year	109.2

A detailed exhibit of the mileage operated on June 30, 1912, showing main line and branches separately, will be found in Table No. 1 of the appendix to this report.

The financial results from operation for the year ended June 30, 1912, will be found in the condensed comparative statement immediately following.

FINANCIAL RESULTS FROM OPERATION—ENTIRE SYSTEM.
INCOME ACCOUNT FOR FISCAL YEAR.

Item.	Year ended June 30, 1912.	Year ended June 30, 1911.	Increase or Decrease.
AVERAGE MILES OPERATED	1,548.2	1,487.0	61.2
OPERATING INCOME:			
RAIL OPERATIONS:			
Operating Revenues	$12,042,542.71	$11,888,036.73	$154,505.98
Operating Expenses	8,419,414.88	8,578,155.22	—158,740.34
Net Operating Revenue	$3,623,127.83	$3,309,881.51	$313,246.32
OUTSIDE OPERATIONS:			
Revenues	$42,292.01	$45,884.20	—$3,592.19
Expenses	56,836.48	56,354.19	482.29
Net Deficit	$14,544.47	$10,469.99	$4,074.48
Total Net Revenue	$3,608.583.36	$3,299,411.52	$309,171.84
TAXES ACCRUED	458,511.60	369,291.55	89,220.05
Total Operating Income.	$3,150,071.76	$2,930,119.97	$219,951.79
OTHER INCOME	897,843.72	526,884.39	370,959.33
GROSS CORPORATE INCOME	$4,047,915.48	$3,457,004.36	$590,911.12
DEDUCTIONS FROM GROSS CORPORATE INCOME	2,430,296.44	2,241,181.28	189,115.16

BALANCE, CREDIT, CARRIED FORWARD TO PROFIT AND LOSS ACCOUNT	$1,617,619.04	$1,215,823.08	$401,795.96

PROFIT AND LOSS ACCOUNT, JUNE 30, 1912.

ITEM.	DR.	CR.
Balance June 30, 1911		$5,110,718.47
Balance for Year brought forward from Income Account		1,617,619.04
Other Properties—Profit		4,044.68
Additions for Year		34,804.04
Extinguishment of Discount on Funded Debt sold	$1,233,965.00	
Deductions for Year	235,422.18	
DIVIDENDS DECLARED:		
On $20,000,000.00 Preferred Capital Stock—		
2% Payable January 15, 1912. }		
2½% Payable July 15, 1912.. }		
$900,000.00		
Less Dividends on stock held by Company	4,785.75	895,214.25
Balance, Credit, June 30, 1912	4,402,584.80	
Total	$6,767,186.23	$6,767,186.23

OPERATING REVENUES.

The total operating revenues for the fiscal year amounted to $12,042,542.71 and exceeded twelve million dollars for the first time in the history of the company. The increase over the preceding year equalled $154,505.98 or 1.30 per cent. while the net operating revenue increased $313,246.32 or 9.46 per cent.

There has been a general revival in business conditions throughout the territory served by this line, during the past few months. Traffic was temporarily interrupted on portions of the line by the destructive floods in the Mississippi River Valley during the months of March and April, 1912. Portions of the Cairo line between Malden and Bird's Point were out of service the greater part of March and April. Trains to and from Memphis, which are operated between this company's main line and Memphis over the tracks of other companies, were annulled for practically the entire month of April. It is gratifying to state that these floods did no damage to the main line tracks of this company which were operated continuously during the water troubles referred to and were used extensively by other lines, under detour arrangements.

Freight revenue increased $104,268.49 or 1.18 per cent. during the year. Excellent cotton and grain crops together with improved business conditions, generally, resulted in a slight increase in the tonnage movement as a whole, notwithstanding a substantial decrease in the tonnage of products of mines and forests.

Passenger revenue shows a decrease of $92,154.51 or 3.85 per cent., which is attributable largely to the flood conditions referred to herein which caused the annulment of all passenger train service to and from Memphis, Tenn., for about thirty days.

The remarkable agricultural development of the country traversed by this line continued uninterruptedly during the past year. This development is reflected by the increased rural immigration, coming principally from the prosperous farming states of the North, better attention to crop production and improved methods of farming. The work of the U. S. Government Farm Demonstration Service is producing splendid results. In Arkansas sixty-four high class men are at work in this service and in connection with the boys' corn clubs and the chief business interests of the State, have established a permanent agricultural exhibit in the old state house at Little Rock, Ark.

The cultivation of rice in Arkansas has proven highly profitable and the acreage devoted to this product continues to increase from year to year.

Fruit growing in East Texas is attracting much attention and the yield for 1912, which was practically all marketed after the close of the fiscal year ended June 30th, exceeded all previous records. More than 3,600 cars of peaches and early vegetables were shipped from that section via this line during the season of 1912.

Living conditions in the territory contiguous to this company's lines continue to improve; the progress being made in the towns and smaller cities is very noteworthy, particularly in respect to the installation of water works systems, sewerage systems, electric light and gas plants; the larger cities continue to extend these facilities. The work of draining the lands, especially in Southeast Missouri and Northeast Arkansas, is being continued. Some of the smaller communities are enforcing health regulations and insisting upon the removal of stagnant water, in compliance with strict sanitary requirements; all of which while contributing to the health, comfort and prosperity of the communities, has tended to increase taxation. Many of the rural communities, particularly where drainage ditches have been constructed, show a very decided improvement in living conditions, which is gradually becoming known to the public generally, and, as a result, farmers coming into the country contiguous to this company's lines are of a better class than heretofore.

A number of new industries have located along this line during the past year and the industrial development has kept pace with the agricultural and general business development.

OPERATING EXPENSES.

The total operating expenses for the fiscal year, compared with the preceding year, show a decrease of $158,740.34 or 1.85 per cent. The per cent. of operating expenses to operating revenues this year was 69.92 as against 72.16 last year, a decrease of 2.24 per cent.

The following changes occurred in the general operating expense accounts:

Maintenance of Way and Structures	decreased,	$322,847.16,	or 17.94%
Maintenance of Equipment	increased,	108,223.79,	or 5.24%
Traffic Expenses	increased,	33,370.07,	or 7.49%
Transportation Expenses	decreased,	53,960.08,	or 1.42%
General Expenses	increased,	76,473.04,	or 16.26%

A comparison of operating expenses in detail, by primary, as well as by general accounts, is shown in Exhibit "B" on pages 26 and 27.

TAXES.

Taxes accrued for the fiscal year ended June 30, 1912, show an increase over the preceding fiscal year of $89,220.05 or 24.16%. This increase is due to the higher valuations placed on the company's property in the several States, particularly the State of Arkansas, and to increases in rates of taxation in all states in which the company owns property.

TRAIN AND CAR LOADING.

The following tables show the average load per freight train and per loaded freight car for the past ten years.

Average load, in tons, per loaded car (including company material).

Year ended June 30.	St. L. S-W. Ry Co.	St. L. S-W. Ry. Co. of Tex.	Entire System.
1903	18.00	15.40	17.19
1904	18.29	15.62	17.43
1905	18.19	15.54	17.43
1906	18.79	16.63	18.13
1907	19.01	17.06	18.40
1908	19.25	17.34	18.69
1909	17.84	16.67	17.49
1910	18.58	16.89	18.14
1911	18.78	17.30	18.32
1912	18.02	16.44	17.54

Average load, in tons, per train (including company material).

Year ended June 30.	St. L. S-W. Ry Co.	St. L. S-W. Ry. Co. of Tex.	Entire System.
1903	383.70	167.09	281.63
1904	387.65	172.20	284.72
1905	385.02	177.33	295.50
1906	415.15	194.49	315.06
1907	425.92	202.81	323.35
1908	407.61	189.99	311.19
1909	394.23	190.34	301.61
1910	434.16	196.27	326.11
1911	423.70	200.04	320.16
1912	447.25	211.19	340.58

EQUIPMENT.

The following equipment, contracted for under trust agreement during the preceding year, was received during the current year: 479 automobile cars and 63 refrigerator cars.

During the fiscal year there was purchased for cash, and built at company shops, from current fund, equipment as follows: 2 dining cars, 5 cabooses, 140 box cars, 7 stock cars, 1 coal car, 20 ballast cars, 1 derrick car, 40 steel flat cars, 1 steam wrecker, 3 locomotive cranes and 2 tool cars.

Contracts have been executed covering equipment to be delivered on or before October 1, 1912, as follows: 18 consolidated locomotives, 4 mogul switch engines, 10 steel baggage cars and 10 steel combination baggage and mail cars.

ADDITIONS AND BETTERMENTS.

Expenditures for Additions and Betterments—Road, during the current year amounted to $2,114,446.14 and for Equipment, after allowing for value of equipment retired, $1,222,135.67, making the total amount expended for additions and betterments during the year $3,336,581.81.

The exhibit styled "Property Investment—Road and Equipment" on page 31, shows, in detail, the expenditures for additions and betterments during the current fiscal year.

WELLS FARGO & CO.—EXPRESS CONTRACT.

A contract, effective August 1, 1911, was entered into with Wells Fargo & Co., granting that company express privileges over this company's lines. Owing to retirement from business, the Pacific Express Co. ceased to operate over this companys' lines on July 31, 1911.

CENTRAL ARKANSAS & EASTERN RAILROAD CO.

The construction of the Central Arkansas & Eastern R. R., consisting of 43.9 miles, was completed during the fiscal year and taken over for operation by this company on October 22, 1911, under the terms of a thirty-year lease.

TRACKAGE RIGHTS FOR PASSENGER TRAINS BETWEEN BRINKLEY, ARK., AND MEMPHIS, TENN.

Effective April 1, 1912, a contract was entered into with the Chicago, Rock Island & Pacific Ry. Co. under the terms of which this company is granted the right to operate its passenger trains over the rails of that company between Brinkley, Ark., and West Memphis, Ark., a distance of 64.7 miles. Between West Memphis and the new Union Station at Memphis the tracks of the Kansas City and Memphis Ry. and Bridge Co. (Memphis bridge), the St. Louis and San Francisco R. R. Co. and the Memphis Union Station Co., are used for a distance of 3.4 miles.

USE OF MEMPHIS UNION STATION.

Effective April 1, 1912, the new Union passenger station at Memphis, Tenn., constructed by the Memphis Union Station Co., of which this Company owns a one-fifth proprietary interest, was opened for operation. All of this company's passenger trains to and from Memphis use this new station. The Louisville and Nashville R. R. Co., Nashville, Chattanooga and St. Louis Ry., Southern Ry. Co. and St. Louis, Iron Mountain and Southern Ry. Co. each owns a one-fifth proprietary interest in this new station and uses the same jointly with this company.

NEW PASSENGER TERMINALS AT DALLAS, TEXAS.

The Union Terminal Co., Dallas, Texas, has been organized by all lines entering that city for the purpose of constructing a union passenger station and facilities therefor. This company owns one-eighth of the capital stock of the new company and will make use of its facilities, when completed, in the operation of passenger trains to and from Dallas.

FREIGHT HOUSE, TEAM TRACKS, ETC., AT ST. LOUIS, MO.

The new freight house and auxiliary facilities at St. Louis, Mo., are nearing completion and will be ready for use within the next few months.

FREIGHT TERMINALS AT FT. WORTH, TEXAS.

A desirable location in Ft. Worth, Texas, has been selected, and the property acquired, on which to construct a freight house, team tracks, etc. This new terminal will be pushed to completion as rapidly as possible.

Following these remarks, in the sections headed respectively, "Financial Exhibits," "Traffic," "Transportation," "Maintenance of Way and Structures," "Maintenance of Equipment," etc., will be found a complete analysis of the financial conditions, results from operation, and the maintenance and improvement, of the property.